OPERATION AND MAINTENANCE MANUAL

RD - 300

IFR INC

RD-300

WEATHER RADAR TEST SET

10200 West York/Wichita, Kansas 67215 USA/(316)522-4981/TWX.910-741-6952

1002-2502-300

PUBLISHED BY
IFR SYSTEMS, INC.
Wichita, Kansas

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WARNING:

HIGH VOLTAGE EQUIPMENT

THIS EQUIPMENT CONTAINS CERTAIN CIRCUITS AND/OR COMPONENTS OF EXTREMELY HIGH VOLTAGE POTENTIALS, CAPABLE OF CAUSING SERIOUS BODILY INJURY OR DEATH. WHEN PERFORMING ANY OF THE PROCEDURES CONTAINED IN THIS MANUAL, HEED ALL APPLICABLE SAFETY PRECAUTIONS.

RESCUE OF SHOCK VICTIMS

1. DO NOT ATTEMPT TO PULL OR GRAB THE VICTIM
2. IF POSSIBLE, TURN OFF THE ELECTRICAL POWER.
3. IF YOU CANNOT TURN OFF ELECTRICAL POWER, PUSH, PULL OR LIFT THE VICTIM TO SAFETY USING A WOODEN POLE, A ROPE OR SOME OTHER DRY INSULATING MATERIAL.

FIRST AID

1. AS SOON AS VICTIM IS FREE OF CONTACT WITH SOURCE OF ELECTRICAL SHOCK, MOVE VICTIM A SHORT DISTANCE AWAY FROM SHOCK HAZARD.
2. SEND FOR DOCTOR AND/OR AMBULANCE.
3. KEEP VICTIM WARM, QUIET AND FLAT ON HIS/HER BACK.
4. IF BREATHING HAS STOPPED , ADMINISTER ARTIFICIAL RESUSCITATION. STOP ALL SERIOUS BLEEDING.

LIMITED WARRANTY AND SERVICE INSTRUCTIONS

A. Limited Warranty.

B. IFR, Inc., warrants that each new instrument manufactured by it is free from defects in material or workmanship under normal use and service for a period of two years from the shipping date. (NOTE: 90 day warranty on battery pack). Each instrument is functionally tested immediately prior to shipment. If, upon examination by IFR, the instrument is determined to be defective in workmanship or material, IFR will, subject to the conditions set forth below, either repair the defective part or replace it with a new part on a pro rata basis. IFR shall not be liable for any delay or failure to furnish a replacement part resulting directly or indirectly from any governmental restriction, priority or allocation or any governmental regulatory order or action, nor shall IFR be liable for damages by reason of the failure of the instrument to perform properly or for any consequential damages. The warranty does not apply to any instrument that has been subject to negligence, accident, shipping damage, misuse or improper installation or operation, or that in any way has been tampered with, altered or repaired by any person other than an authorized IFR service organization or any employee thereof, or to any instrument whose serial number has been altered, defaced or removed, or to any instrument purchased within, and thereafter removed beyond, the continental limits of the United States. Annual recalibration is not included in warranty.

C. All sales are FOB IFR Factory, Wichita. IFR will assume responsibility for freight charges on all legitimate warranty claims within thirty (30) days from the original shipping date. All legitimate warranty claims within thirty (30) to ninety (90) days should be shipped to IFR freight collect and will be returned freight collect. All freight on warranty claims after ninety (90) days will be paid by the customer.

D. This warranty shall, at IFR's option, become void if the equipment ownership is changed, unless the prior owner or the proposed owner obtains approval of continuation of the warranty prior to the change of ownership.

E. This warranty is in lieu of all other warranties, expressed or implied, and no one is authorized to assume any liability on behalf of IFR or impose any obligation upon it in connection with the sale of any instrument, other than as stated above.

F. Changes in Specifications.

G. The right is reserved to change the published specifications of the equipment at any time and to furnish merchandise in

accordance with current specifications without incurring any liability to modify equipment previously sold, or to supply new equipment in accordance with earlier specifications except under the classification of special apparatus.

H. Service.

I. When requesting service, the originator shall give IFR information concerning the nature of the failure and the manner in which the equipment was used when the failure occurred. Type, model, and serial number should also be provided.

J. Do not return any products to the factory without first receiving authorization from the factory Customer Service Department.

CONTACT:

IFR SYSTEMS, Inc.
10200 W. York
Wichita, Kansas 67215 USA

ATTN: Customer Service Department

PHONE: (800) 835-2350 (Customer Service Only)

TWX: 910-741-6952

K. Unless otherwise specifically requested, packaging for a return shipment shall be in the original container and packaging material. If the original container and material are not available, information as to suitable packaging techniques will be provided by the IFR Shipping Department.

L. Returned material claimed defective, but found to meet all previously applicable specifications, will be subject to a minimum evaluation charge consisting of the labor charges involved in the status determination of the material.

M. Returned material not accompanied by statement of claimed defects may be returned at the originator's expense.

N. Any departure from the above instructions without specific factory authorization can be considered a breach of warranty, and all expenses incurred as a result will be billed to the originator.

CAUTION

THE RD-300 MAXIMUM POWER INPUT CAPABILITY OF THE X-BAND MIXER DIODE IS 60 WATTS PEAK AT THE RF PORT. TO PREVENT DESTRUCTION OF THE MIXER DIODE, NEVER CONNECT A DEVICE CAPABLE OF GENERATING POWER IN EXCESS OF 60 WATTS PEAK DIRECTLY TO THE RF PORT. ALWAYS USE AN APPROPRIATE 10 dB ATTENUATOR BETWEEN THE DIRECTIONAL COUPLER AND THE RD-300 WHEN TESTING RADAR UNITS CAPABLE OF DELIVERING 12 KW PEAK POWER OR MORE. SEE OPERATING INSTRUCTIONS FOR CONNECTIONS, TEST PROCEDURES, AND ATTENUATOR SPECIFICATIONS.

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SECTION I

GENERAL DESCRIPTION AND SPECIFICATIONS

1-1. GENERAL DESCRIPTION. The RD-300 is designed as a precision simulator-tester of aircraft weather radar instruments. The RD-300, in conjunction with the oscilloscope, can perform virtually all routine radar testing. Because the RD-300 is connected to the unit-under-test through just one calibrated coaxial cable, there is no need to reconfigure the test equipment to measure different parameters.

1-1-1. The RD-300 features a signal generator system which automatically acquires and tracks the magnetron frequency to eliminate constant retuning of the signal generator to compensate for magnetron or signal generator drift. The signal generator is modulated to simulate storm cell echoes in several modes, including Contour Mode. Contour Mode is used for rapid calibration and checkout of contour threshold circuits. The range delay of these simulated storm cell echoes is calibrated in microseconds (μs) or nautical miles (NM). Multiple returns can be generated to check and adjust the radar range ring display. An auxiliary modulation mode develops narrow, short range pulses for testing multimode radars.

1-1-2. Measurement of the magnetron frequency and PRF appears on the Digital Display (12). The magnetron condition and spectrum characteristics can be checked using the detector and discriminator outputs. Peak power measurements are possible with a full scale sensitivity of 12 kW (or 120 kW peaks with the external 10 dB attenuator).

1-1-3. The IF Signal Generator covers from 20 to 70 MHz and can be swept. The two-Volt-rms maximum output can be used for high level IF or AFC testing. Bandwidths and center frequencies are measured by the Marker Frequency Generator during swept IF tests. The RD-300 also features an antenna simulator output, which allows the display assembly to be swept at a variable rate.

1-2. SPECIFICATIONS

RF SIGNAL GENERATOR:

Variable Mode Frequency:	Continuously variable from 9.295 GHz to 9.425 GHz.
Track Mode Frequency:	Tracks magnetron frequency within ±25 kHz (pulse width > 2 µs); ±100 kHz (pulse width from 0.5 µs to 2.0 µs).
ΔF Mode (during Track):	Signal generator frequency may be offset ±0.75 MHz from magnetron for AFC centering tests. Front panel meter reads ΔF offset.
Output Power:	-50 to -127 dBm in 1 and 10 dB steps calibrated at R/T plus 0 to 20 dB boost with CONTOUR control; accuracy ±2 dB.
Aux RF Output:	-20 to -127 dBm plus 0 to 20 dB boost with CONTOUR control. (Maximum power with full boost: -10 dBm).
Source VSWR at Input of R/T unit under test:	<1.25.

IF SIGNAL GENERATOR:

Frequency:	20 to 70 MHz.
Sweep Width:	0 to 4 MHz centered at counter reading.
Marker Frequency:	Continuously variable from 20 to 70 MHz; may be displayed on frequency counter display.
Power:	+20 to -130 dBm in 1 and 10 dB steps in two ranges; accuracy ±1.5 dB.

MODULATION (IF or RF):

Modes-Track (RF only):	PRF same as radar-under-test.
Internal:	PRF adjustable from 50 to 500 Hz.
CW:	Continuous wave
EXT (+), EXT (-):	External synchronization: Sine Wave or pulses, 2 to 50 V pk, 50 to 500 Hz.
Pulse Width:	Normal mode: 2.0 to 30 µs Auxiliary mode: 0.2 to 3.0 µs. Contour mode: 270 µs Fixed.
Pulse Delay:	Normal Mode: steps from 1 to 999 µs or NM, 1 to 9 pulses.
	Auxiliary Mode: continuously variable 2.1 to 29.6 µs (0.17 to 2.4 NM).
Sync Out Signal:	Simultaneous with signal generator pulse output or simultaneous with radar's magnetron pulse in Track Mode.
CONTOUR Mode (RF only):	Amplitude of the signal generator pulse may be increased 0 to 20 dB above the attenuator setting.

FREQUENCY COUNTER:

RF:	Displays magnetron frequency in Track Mode and signal generator frequency in Manual or Auxiliary Modes; resolution 0.01 MHz.
IF:	Displays IF frequency, center frequency in sweep mode, or marker frequency upon push button command; resolution 1 kHz.

PRF:	Displays pulse repetition frequency of magnetron in Track Mode or of signal generator in Internal Modulation Mode; resolution 1 Hz.
ANTENNA SIMULATOR OUTPUT:	Variable scan rate 0 to 150 looks per minute. Variable in angle to ±89°. Also variable in static position ±89°. Has resolver, three phase synchro, and pot output for antenna simulation and pitch or roll output with 8° lead for stabilization platform testing and 45° offset for RCA units.
POWER METER:	
Range:	0.1 to 12 kW peak (or 1.0 to 120 kW peak with external 10 dB attenuator).
Accuracy:	±0.6 dB from 2 to 12 kW peak.
MISCELLANEOUS OUTPUTS:	(Used to Evaluate Magnetron Spectrum)
Detector:	Detected magnetron signal used to check pulse shape with external oscilloscope.
Spectrum Analyzer:	Attenuated RF sample of magnetron signal used to check pulse spectrum with external analyzer.
Discriminator:	Fast response discriminator output used to measure magnetron's frequency pushing using oscilloscope; 0.1 V/MHz sensitivity.

PHYSICAL CHARACTERISTICS:

Power:	115/230 VAC 50 to 400 Hz, 150 watts
Dimensions:	16.75" (42.55 cm) wide, 7.50" (18.05cm) high, 18.38" (46.69 cm) deep.
Weight:	Approximately 53 lbs. (24.09 kg.)

SECTION II

INSPECTION

2-1. INCOMING INSPECTION. Each IFR Precision Simulator is carefully inspected for mechanical and electrical quality before shipment from the factory. On receipt, the instrument should be physically free of mars and scratches, and in perfect mechanical and electrical order. The instrument should be inspected immediately for possible in-transit physical damage. A check for supplied accessories,* and a test of the electrical performance of the instrument (as outlined in Section V of this manual) should also be made. Any damage or deficiency should be reported immediately to the carrier and a claim filed, if necessary. Refer to the LIMITED WARRANTY AND SERVICE INSTRUCTIONS of this manual for delineation of responsibilities and liabilities. Follow the directions in the LIMITED WARRANTY AND SERVICE INSTRUCTIONS when it becomes necessary to ship the instrument.

2-2. GROUNDING REQUIREMENTS. To protect operating personnel, the National Electrical Manufacturer's Association (NEMA) recommends that the instrument panel and cabinet be grounded. All IFR instruments are equipped with a three-conductor power cord which, when plugged into an appropriate receptacle, grounds the instrument. The offset pin on the power cord three-prong connector is the ground wire.

2-2-1. To preserve this protection feature when operating the instrument from a two-contact outlet, use a three-prong to two-prong adapter and connect the green pigtail on the adapter to ground.

2-3. CLEANING. It is wise to clean the dust, cobwebs, and other debris out of the test set prior to periodic inspection, repair or calibration. Some shops clean their test equipment on a regular basis such as biannual or annual proof-of-performance checks. Annual recalibration of the set is advisable.

2-3-1. Dust removal is best done with a hand controlled dry air jet of 25 to 50 psi (1.827 kg/cm^2 to 3.653 kg/cm^2). The Rear Panel should be cleaned with a dry cloth only. The Front Panel may be cleaned whenever necessary with a lint-free cloth moistened with rubbing alcohol.

2-3-2. CARE MUST BE TAKEN TO AVOID BREAKING WIRES OR SHORTING COMPONENT LEADS TOGETHER DURING CLEANING.

* Accessories Supplied: Dummy Load, Waveguide Directional Coupler, Serialized Coaxial Cable, RD-300 Manual, Antenna Simulator Connector, four sets of thumb screws and nuts, 50Ω type N Termination, Line Cord.

2-4. PRELIMINARY INSPECTION PROCEDURES. Preliminary inspection is necessary to determine the general condition of the test set. It has been determined through hard experience that deliberate moving, however slight, of the discrete components on the various PC Boards and other assemblies often causes unnecessary circuit problems and can quickly change simple problems into complex ones. Therefore, IFR recommends ONLY A VISUAL INSPECTION without touching the components. Test set owners and operators should be aware that ANY opening of the instrument casing can result in calibration deviations. Complex modules, such as RF modules, should NOT be opened during Preliminary Inspection.

2-4-1. Procedures:

1. Chassis. Inspect the chassis for tightness of sub-assemblies, damaged chassis-mounted connectors, and corrosion or damage to the metal surfaces. Surface damage may indicate further damage to parts in the area.

2. Capacitors. Inspect all readily available capacitors for loose mounting, deformities or obvious physical damage, and leakage or corrosion around the leads.

3. Connectors. Examine all readily available coax connectors for loose or broken parts, cracked insulation, and bad contacts. DO NOT disassemble connectors within the test set.

4. Potentiometer Controls. Any Front Panel potentiometer control that feels rough when rotated should be checked with an ohmmeter for proper operation.

5. Resistors. Inspect all readily available resistors for cracked, broken, charred, or blistered bodies and loose or corroded soldering connections.

6. Printed Circuit (PC) Boards. (Readily available PC Boards only). Check the connectors and mating plugs for corrosion and damage. Inspect all mounted components, including crystals and IC's, for damage. The PC Boards should be free of all foreign material.

7. Semiconductors. Inspect all readily available diodes, rectifiers, and transistors for cracked, broken, charred, or discolored bodies. Check the ends of the components to see that the seals around the leads are in place and in good condition.

8. Switches. Examine all readily available toggle switches for loose levers, terminals, and switch body connection to frame. The line switch contacts should not be bent or the switch action too loose.

9. Transformer. Inspect the transformer for signs of excessive heating, broken or charred insulation, and loose mounting hardware.

10. Wiring. Inspect all the wiring of the chassis for broken or loose ends and connections and for proper dress relative to other chassis parts. All the laced wiring should be tight with the ends securely tied.

2-5. REPACKING FOR SHIPPING. The LIMITED WARRANTY AND SERVICE INSTRUCTIONS contain detailed directions for repacking and shiping. Additional questions may be directed to the IFR Shipping Department.

NOTE

Any instrument shipped to IFR for any reason MUST be tagged with (1) its owner's identification, (2) the service or repair required, (3) its model number, and (4) its full serial number. Identify the instrument by prefix, model, and serial number in ALL correspondence.

2-5-1. IFR Precision Simulators should be shipped ONLY in their original containers. If the original container is not available, contact IFR for shipping instructions.

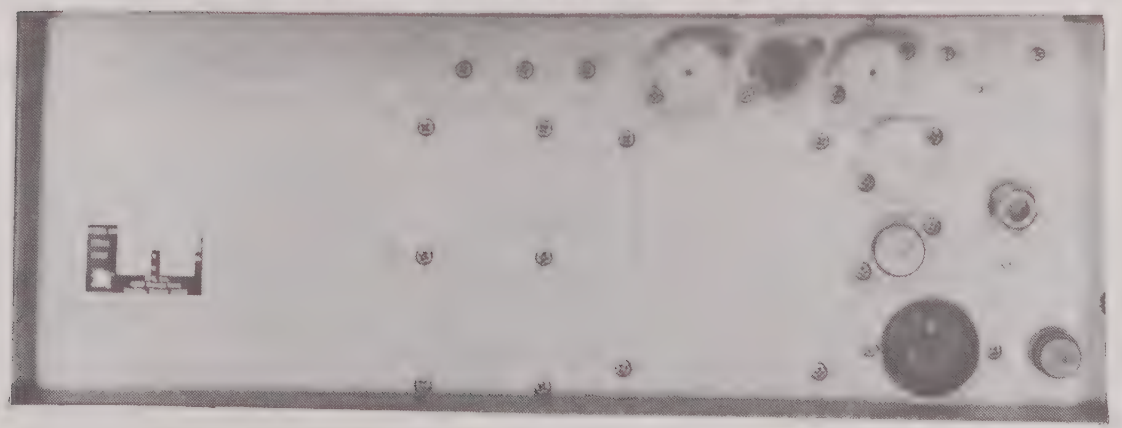
2-5-2. DO NOT return an instrument or its component parts to IFR without first receiving authorization from the IFR Customer Service Department. Refer to the LIMITED WARRANTY AND SERVICE INSTRUCTIONS for complete directions.

SECTION III

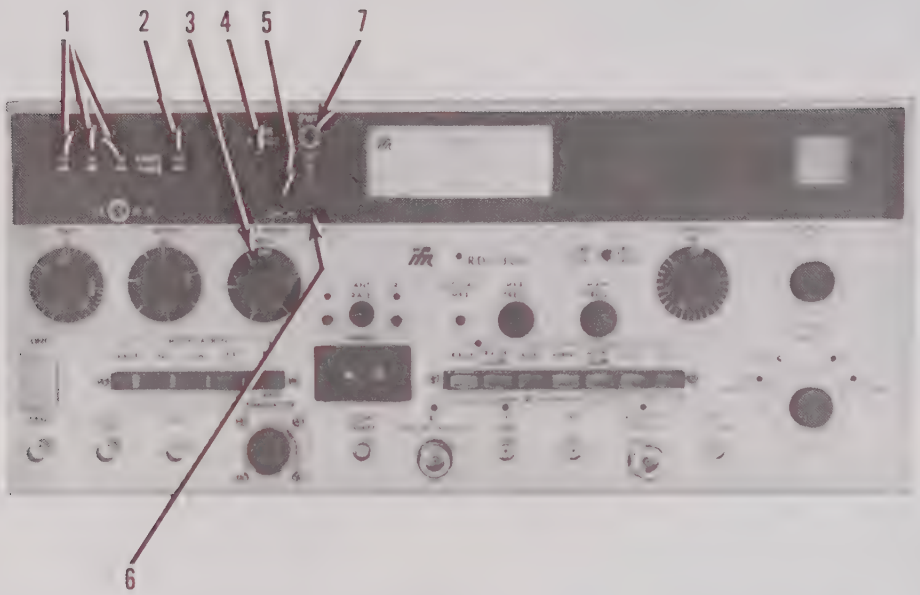
OPERATING PROCEDURES

RD-300 Front Panel Effective Prior to S/N 109

RD-300 Front Panel Effective S/N 109 & on

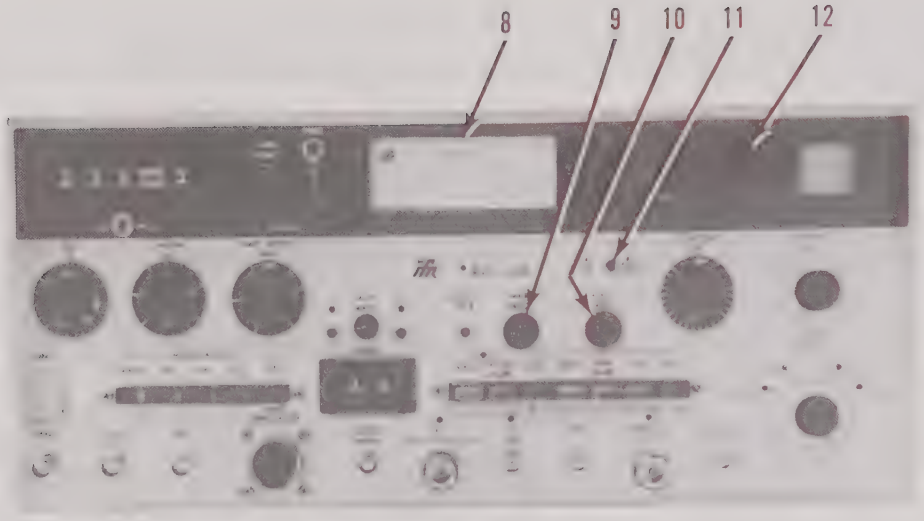


RD-300 Rear Panel



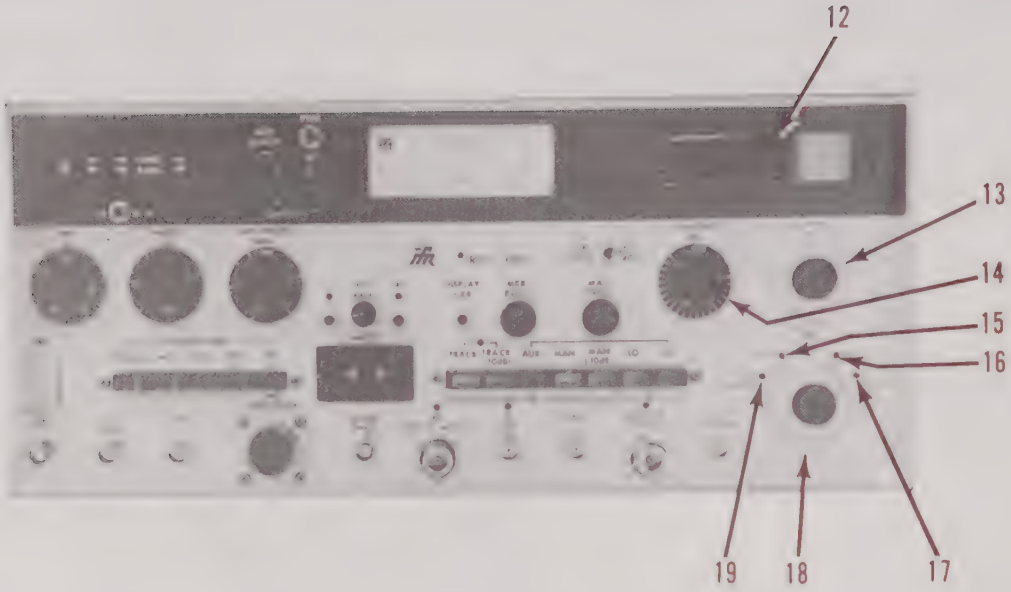
CONTROL/INDICATOR/CONNECTOR	FUNCTION
1. RANGE SELECTOR	THREE THUMBWHEEL SWITCHES USED TO SELECT RANGE DELAY OF SIMULATED RETURN FROM 1 TO 999 IN MICROSECONDS (µS) OR NAUTICAL MILES (NM). START OF DELAY IS CONTROLLED BY MODULATION MODE SELECTORS (42).
2. RANGE RING SELECTOR	THUMBWHEEL SWITCH USED TO SELECT NUMBER OF EQUALLY SPACED SIMULATED RETURNS. 1 THROUGH 9 POSITIONS SELECT NUMBER OF EQUALLY SPACED RANGE RINGS. AUX POSITION SELECTS SINGLE, CONTINUOUSLY VARIABLE RANGE RING WITH RANGE DELAY OF 2.1 TO 29.5 µS (.17 TO 2.4 NM) CONTROLLED BY AUX RANGE CONTROL (4) AND RING WIDTH OF 0.2 TO 3.0 µS CONTROLLED BY WIDTH CONTROL (43).

CONTROL/INDICATOR/CONNECTOR	FUNCTION
3. SWP WIDTH MHz CONTROL	SWEEP WIDTH CONTROL CONTROLS WIDTH OF PK-PK SWEEP OF IF SYSTEM. SWEEP RATE IS 100 Hz.
4. AUX RANGE CONTROL	PROVIDES CONTINUOUSLY VARIABLE DELAY OF SIMULATED RETURN FROM 2.1 TO 29.5 µS (.17 TO 2.4 NM) WHEN AUX RANGE RINGS (2) IS SELECTED.
5. UNCAL INDICATOR (RED)	LIGHT EMITTING DIODE INDICATOR WHICH COMES ON TO INDICATE THAT THE ΔF CONTROL (6) IS NOT IN THE CAL, DETENT, POSITION AND THE SYSTEM (IN TRACK MODE) IS TRACKING THE MAGNETRON FREQUENCY WITH AN OFFSET DETERMINED BY THE ΔF CONTROL.
6. ΔF CONTROL	THE DELTA FREQUENCY (ΔF) CONTROL IS USED TO OFFSET THE RF SIGNAL GENERATOR FREQUENCY BY UP TO ±0.75 MHZ FROM THE MAGNETRON FREQUENCY IN THE RF TRACK MODES. FREQUENCY OFFSET IS INDICATED ON THE ΔF SCALE OF THE PANEL METER (8) WHEN THE PWR/ΔF SWITCH (7) IS IN THE ΔF POSITION. THE FREQUENCY OFFSET IS REMOVED WHEN THE ΔF CONTROL IS THE CAL, DETENT, POSITION.
7. PWR/ΔF CONTROL	POWER/DELTA FREQUENCY SWITCH CONTROLS THE FUNCTION OF PANEL METER (8). PWR POSITION, THE METER INDICATES THE PEAK PULSE OUTPUT POWER OF THE UNIT-UNDER-TEST. IN ΔF POSITION, THE METER INDICATES THE FREQUENCY DIFFERENCE BETWEEN THE MAGNETRON AND THE TEST SET SIGNAL GENERATOR. IN TRACK MODE, THE TEST SET CONTINUES TO TRACK THE MAGNETRON, BUT WITH AN OFFSET SELECTED BY THE ΔF CONTROL (6).



CONTROL/INDICATOR/CONNECTOR	FUNCTION
8. PANEL METER	METER USED TO INDICATE MAGNETRON PEAK POWER OR OFFSET BETWEEN MAGNETRON AND SIGNAL GENERATOR. KW PEAK SCALE INDICATES PEAK RF POWER OF MAGNETRON SIGNAL AT RF CONNECTOR OVER A 1 TO 12 KW RANGE. PWR/ΔF SWITCH (7) MUST BE IN PWR POSITION. TO MEASURE 10 TO 120 KW EXTERNAL 10 dB COAXIAL ATTENUATOR MUST BE CONNECTED TO CROSSGUIDE COUPLER OUTPUT. NOTE: CALIBRATION DEPENDS ON CROSSGUIDE COUPLER AND COAX CABLE LOSSES AND IS ONLY VALID WHEN THE TEST SET IS USED WITH ITS SERIALIZED COUPLER AND CABLE. TEST SET MUST BE RECALIBRATED IF REPLACEMENT COUPLER OR CABLE IS TO BE USED.

CONTROL/INDICATOR/CONNECTOR	FUNCTION
8. PANEL METER (CONT'D)	ΔF-MHZ SCALE INDICATES OFFSET BETWEEN MAGNETRON AND SIGNAL GENERATOR FREQUENCIES FOR RF TRACK MODES. PWR/ΔF SWITCH (7) MUST BE IN ΔF POSITION.
9. MKR FREQ CONTROL	USED TO ADJUST IF MARKER FREQUENCIES WHEN DISPLAY MKR SWITCH (29) IS PRESSED.
10. MAN FREQ CONTROLS	MANUAL FREQUENCY CONTROLS ARE USED FOR COARSE (OUTER KNOB) AND FINE (INNER KNOB) ADJUSTMENT OF SIGNAL GENERATOR FREQUENCY FOR RF AUX, RF MAN, RF MAN (-10DB), IF LO, AND IF HI MODES (25).
11. PRF/RF - PITCH/ROLL SWITCH	USED TO CONTROL FUNCTION OF DIGITAL DISPLAY (12). PRF POSITION ALLOWS DIGITAL DISPLAY TO DISPLAY PRF OF INTERNAL OSCILLATOR, MAGNETRON, OR EXTERNAL MODULATION INPUT. RF POSITION ALLOWS DIGITAL DISPLAY TO DISPLAY RF OR IF FREQUENCIES. PITCH AND ROLL POSITIONS SWITCH THE SINE RESOLVER OUTPUT OF THE ANTENNA SIMULATOR SYSTEM BETWEEN PINS a AND b, RESPECTIVELY, OF THE ANTENNA SIMULATOR CONNECTOR. THE ANGLE OF PITCH OR ROLL IS DETERMINED BY THE ANGLE SELECTORS (33).
12. DIGITAL DISPLAY (SEVEN SEGMENT GAS DISCHARGE READOUTS).	DISPLAYS THE PRF, IF, AND RF FREQUENCIES. DISPLAYS PRF OF MAGNETRON IN TRACK MODULATION (42) MODE, PRF OF INTERNAL OSCILLATOR IN INT MODULATION (42) MODE, OR PRF OF EXTERNAL TRIGGER SIGNAL IN EXT MODULATION (42) MODE WHEN PRF/RF SWITCH (11) IS IN PRF POSITION.

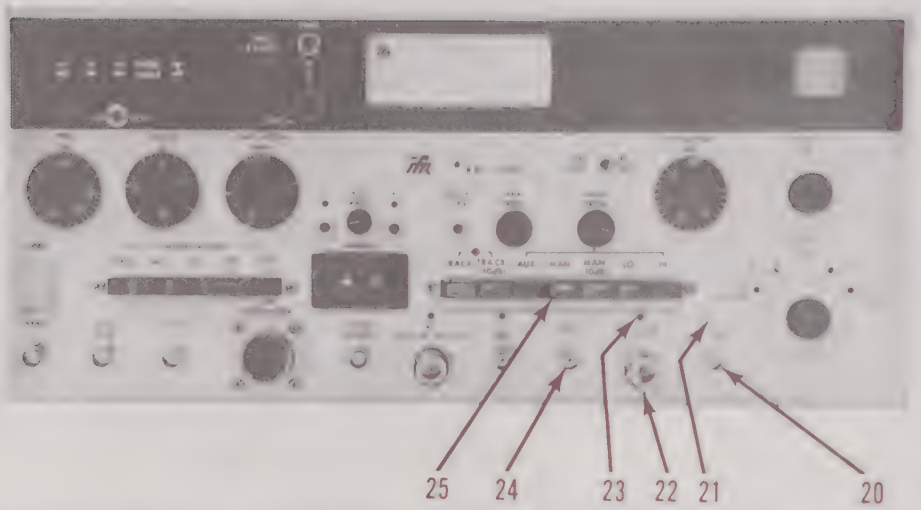


CONTROL INDICATOR CONNECTOR	FUNCTION
12. DIGITAL DISPLAY (CONT'D)	WITH PRF/RF SWITCH (11) IN RF POSITION, DISPLAY IF SIGNAL GENERATOR FREQUENCY IN IF LO (25) AND IF HI (25) MODES OR IF MARKER FREQUENCY WHEN DISPLAY MKR SWITCH (29) IS PRESSED. WITH PRF/RF SWITCH (11) IN RF POSITION, DISPLAYS SIGNAL GENERATOR/MAGNETRON FREQUENCY IN RF TRACK MODES OR SIGNAL GENERATOR FREQUENCY IN RF AUX, RF MAN AND RF MAN (-10 DB) MODES.
13. OUTPUT DB CONTROL	1 DB STEPPED ATTENUATOR DECREASES RF OR IF OUTPUT IN 1 DB STEPS FROM 0 TO -12 DB, TO 10 DB (S/N 282 ON).
14. CONTOUR DB CONTROL	CONTROLS AN INCREASE IN OUTPUT LEVEL* ABOVE THE SETTINGS OF THE STEPPED OUTPUT ATTENUATORS. WHEN CONTROL IS NOT IN OFF (DETENT) POSITION, SIGNAL GENERATOR PULSE WIDTH IS FIXED AT 270 µS FOR 1 THROUGH 9 POSITIONS OF RANGE RINGS SELECTOR (2).

* OF RF AND AUX OUTPUTS ONLY

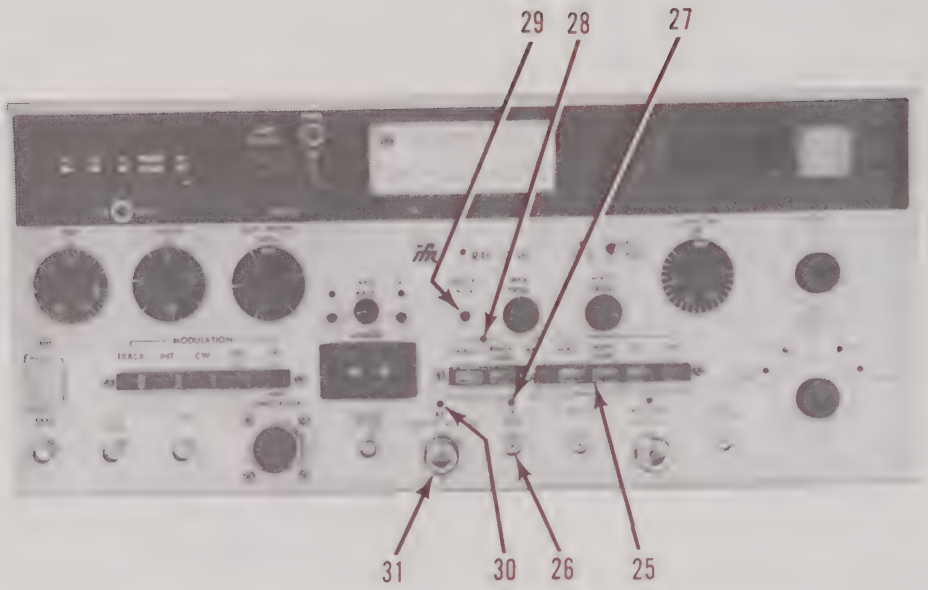
FIG 3-1

CONTROL/INDICATOR/CONNECTOR	FUNCTION
15. IF HI Mode Indicator (GREEN)	Light emitting diode indicator which comes on when IF HI mode (25) is selected to indicate which color scale and which index mark to use for the OUTPUT dBm control (18) setting. The green scale should be used with the index below the indicator.
16. RF Mode Indicator (RED)	Light emitting diode indicator which comes on when RF TRACK or RF MAN mode (25) is selected to indicate which mark to use for the OUTPUT dBm control (18) setting. The red scale should be used with the index below the indicator.
17. RF (-10dB) Mode Indicator (RED)	Light emitting diode indicator which comes on when RF TRACK (-10 dB) or RF MAN (-10 dB) mode (25) is selected to indicate which color scale and which index mark to use for the OUTPUT dBm control (18) setting. The red scale should be used with the index below the indicator.
18. OUTPUT dBm Control	10 dB stepped attenuator varies RF or IF output in 10 dB steps. Red and green scales are indexed to index mark under indicator of same color.
19. IF LO/AUX RF Mode Indicator (RED)	Light emitting diode indicator which comes on when IF LO or AUX RF mode (25) is selected to indicate which color scale and which index mark to use for the OUTPUT dBm control (18) setting. The red scale should be used with the index below the indicator.



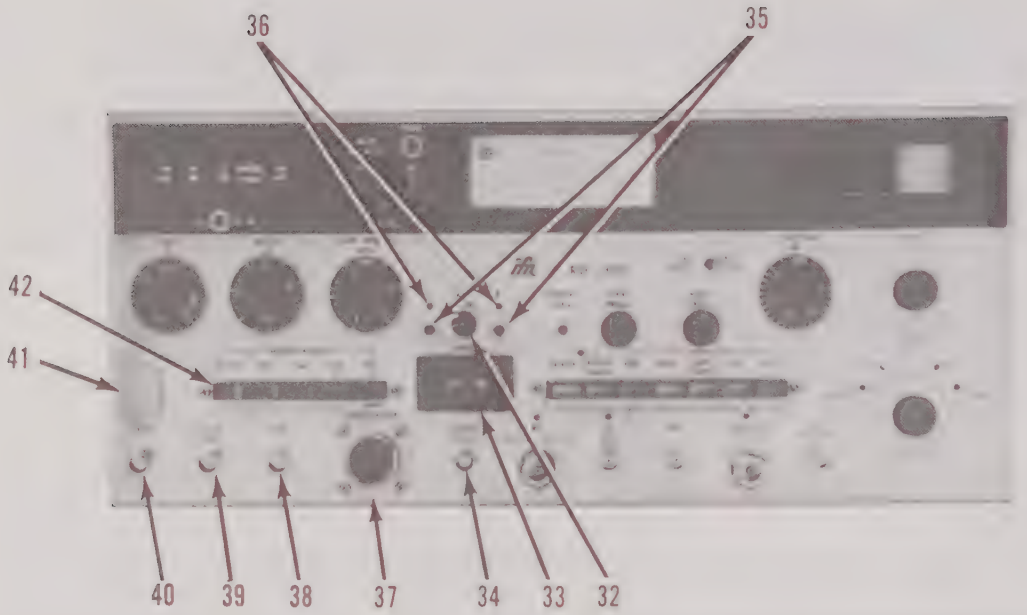
CONTROL/INDICATOR/CONNECTOR	FUNCTION
20. DISC OUT CONNECTOR	DISCRIMINATOR OUTPUT CONNECTOR FOR PULSE DISCRIMINATOR USED TO MONITOR MAGNETRON PULSE FREQUENCY VS. TIME CHARACTERISTICS ON EXTERNAL OSCILLOSCOPE, TRIGGERED FROM SYNC OUTPUT. CALIBRATION FACTOR IS 0.1V/MHZ WHEN TERMINATED IN 50 OHMS AT THE SCOPE. A 35 µS SYSTEM REFERENCE PULSE OCCURS 50 µS AFTER THE MAGNETRON SIGNAL.
21. FINE OFFSET ADJUST	A SCREWDRIVER FINE ADJUSTMENT USED TO ALIGN THE RD-300 FREQUENCY WITH - THE FREQUENCY OF THE MAGNETRON.
22. AUX OUT CONNECTOR	AUXILIARY OUTPUT USED FOR GENERAL SIGNAL GENERATOR APPLICATIONS WITH OUTPUT LEVEL CALIBRATED AT THE CONNECTOR. FULLY PROTECTED AGAINST ACCIDENTAL CONNECTION TO CABLE FROM CROSSGUIDE COUPLER ON R/T UNIT.

CONTROL/INDICATOR/CONNECTOR	FUNCTION
22. AUX OUT CONNECTOR (CONT'D)	OUTPUT LEVEL IS SUM OF OUTPUT dBM (18), OUTPUT DB (13), AND CONTOUR DB (14), CONTROL SETTINGS. MAXIMUM OUTPUT POWER WITH -20 dBM OUTPUT AND FULL CONTOUR BOOST IS APPROXIMATELY -10 dBm.
23. AUX OUT INDICATOR	LIGHT EMITTING DIODE INDICATOR WHICH COMES ON TO INDICATE THAT RF OUTPUT IS AVAILABLE AT AUX OUT CONNECTOR (22) FOR AUX MODE (25).
24. DET CONNECTOR	DETECTOR OUTPUT FOR DISPLAYING MAGNETRON PULSE SHAPE CHARACTERISTICS ON AN EXTERNAL OSCILLOSCOPE. OUTPUT SHOULD BE TERMINATED IN 50 OHMS AT SCOPE FOR BEST PULSE FIDELITY.
25. RF/IF MODE SELECTORS	PUSHBUTTON SELECTORS USED TO SELECT OPERATING MODE OF TEST SET. IN TRACK MODE, RF SIGNAL GENERATOR SYSTEM ACQUIRES AND TRACKS MAGNETRON FREQUENCY OF R/T UNIT CONNECTED TO RF CONNECTOR (31). TRACK (-10 DB) MODE IS SIMILAR TO TRACK MODE BUT IS ONLY USED WITH AN EXTERNAL 10 DB COAXIAL ATTENUATOR INSERTED AT THE CROSSGUIDE COUPLER OUTPUT FOR R/T UNITS WITH 10 TO 120 KW PEAK POWER OUTPUT. IN AUX MODE, RF SIGNAL GENERATOR FREQUENCY IS CONTROLLED BY MAN FREQ CONTROL (10) AND CALIBRATED OUTPUT IS AVAILABLE AT AUX OUT CONNECTOR (22).



CONTROL/INDICATOR/CONNECTOR	FUNCTION
25. RF/IF MODE SELECTORS (CONT'D)	IN MAN MODE, RF SIGNAL GENERATOR FREQUENCY IS CONTROLLED BY MAN FREQ CONTROL (10). OUTPUT IS THROUGH RF CONNECTOR (31) AND IS CALIBRATED AT R/T UNIT WITH SERIALIZED COAX CABLE AND CROSSGUIDE COUPLER. MAN (-10 dB) MODE IS SIMILAR TO MAN MODE BUT IS ONLY USED WITH AN EXTERNAL 10 dB COAXIAL ATTENUATOR INSERTED AT CROSSGUIDE COUPLER OUTPUT FOR R/T UNITS WITH 10 TO 120 KW PEAK POWER OUTPUT. IN LO MODE, IF SIGNAL GENERATOR IS ACTIVATED IN LOW POWER RANGE (-20 TO -130 dBm). MAN FREQ CONTROL (10) CONTROLS FREQUENCY FROM 20 TO 70 MHz. OUTPUT IS AVAILABLE AT IF CONNECTOR (26).

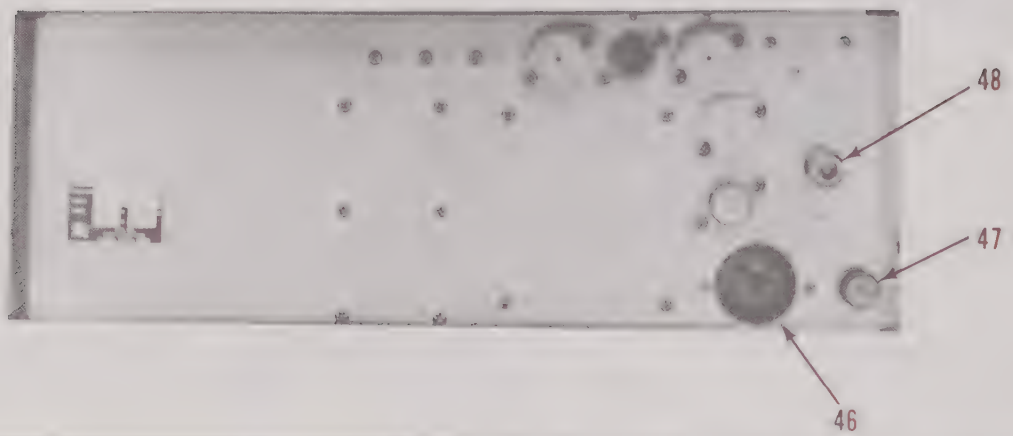
CONTROL/INDICATOR/CONNECTOR	FUNCTION
25. RF/IF Mode Selectors (cont'd)	In HI mode, IF signal generator is activated in high power range (+20 to -90 dBm). MAN FREQ control (10) controls frequency from 20 to 70 MHz. Output is available at IF connector (26).
26. IF Output Connector	50 ohm output connector for IF signal generator. Output level is sum of OUTPUT dBM (18) and OUTPUT dB (13) control settings.
27. IF Output Indicator (red)	Light emitting diode indicator which comes on to indicate that IF output is available at IF output connector (26) for IF LO or IF HI modes (25).
28. TRACK Indicator (red)	Light emitting diode indicator which comes on to indicate that RF signal generator system has acquired magnetron frequency and is tracking the frequency in TRACK modes (25).
29. DISPLAY MKR Switch	Display Marker switch is pressed to add marker signal (signal level approx. -20 dBc) to IF output (26) and display marker generator frequency on Digital Display (12).
30. RF Output Indicator (red)	Light emitting diode indicator which comes on to indicate that RF output is available at RF output connector (31) for TRACK, TRACK (-10 dB), MAN or MAN (-10 dB) modes (25).
31. RF Output Connector	Input/output connector to couple Test Set to antenna waveguide port on R/T unit. Output is calibrated at R/T unit using serialized coax cable and crossguide coupler. Output level is sum of OUTPUT dBM (18), OUTPUT dB (13) and CONTOUR dB (14) control settings.



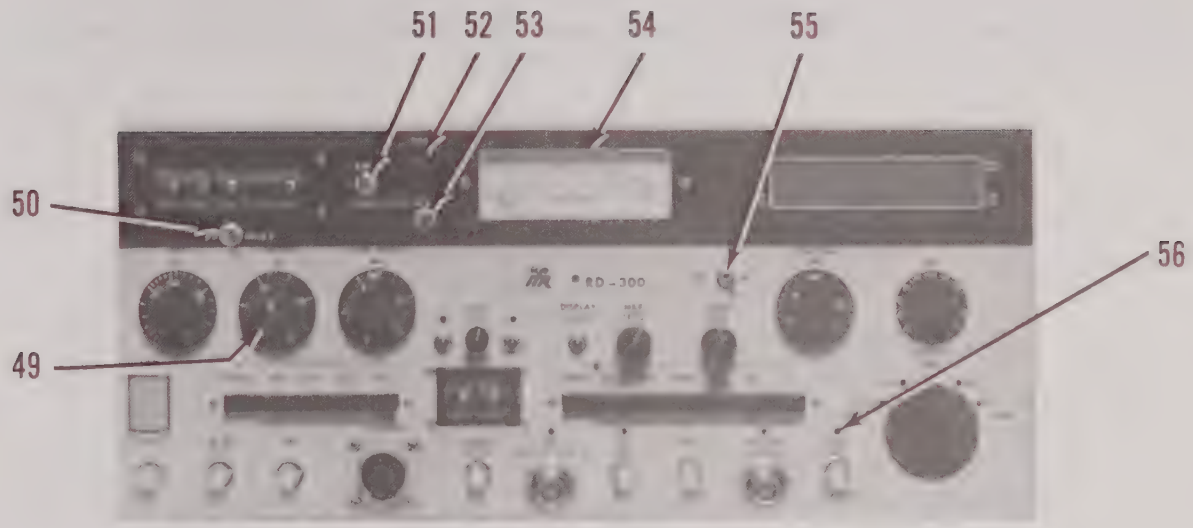
CONTROL/INDICATOR/CONNECTOR	FUNCTION
32. ANT RATE CONTROL	CONTROLS SCAN RATE OF ANTENNA SIMULATOR SYSTEM FROM 0 TO 150 LOOKS PER MINUTE. IN DETENT (OFF) POSITION, SIMULATED ANTENNA POSITION IS STATIC (FIXED) AT ANGLE SELECTED BY ANGLE SELECTORS (33) IN QUADRANT SELECTED BY ANTENNA QUADRANT SELECTORS (35).
33. ANGLE SELECTORS	TWO THUMB WHEEL SWITCHES USED TO SELECT MAXIMUM SWEEP ANGLE FOR ANTENNA SIMULATOR SWEEP SYSTEM OR STATIC SIMULATED ANTENNA POSITION WHEN ANT RATE CONTROL (32) IS IN DETENT POSITION (SWEEP SYSTEM DISABLED). ANGLE CAN BE VARIED FROM 0° TO 89°. PITCH AND ROLL POSITIONS OF THE PRF/RF - PITCH/ROLL SWITCH (11) SET THE SINE RESOLVER OUTPUT OF THE ANTENNA SIMULATOR SYSTEM BETWEEN PINS a AND b, RESPECTIVELY, OF THE ANTENNA SIMULATOR CONNECTOR. THE ANGLE OF PITCH OR ROLL IS DETERMINED BY THE ANGLE SELECTORS.

FIG 3-1
3-12

CONTROL/INDICATOR/CONNECTOR	FUNCTION
34. SCOPE SWEEP CONNECTOR	OUTPUT FOR 2.5 VOLT PK-PK, 100 Hz RAMP FOR HORIZONTAL DRIVE TO AN EXTERNAL OSCILLOSCOPE DURING IF SWEEP TESTS.
35. ANTENNA QUADRANT SELECTORS	PUSHBUTTON SWITCHES USED TO SELECT EITHER A RIGHT OR LEFT STATIC SIMULATED ANTENNA POSITION WHEN ANT RATE CONTROL (32) IS IN DETENT POSITION. ANTENNA QUADRANT INDICATORS (36) INDICATE QUADRANT.
36. ANTENNA QUADRANT INDICATORS (RED)	LIGHT EMITTING DIODE INDICATORS WHICH COME ON TO INDICATE WHICH QUADRANT OF THE DISPLAY THE SIMULATED ANTENNA IS SCANNING {LEFT (L) OR RIGHT (R) OF CENTER OF DISPLAY}.
37. ANT SIMULATOR CONNECTOR	OUTPUT CONNECTOR FOR ANTENNA SIMULATOR SYSTEM. SYNCHRO, RESOLVER, AND DC POT OUTPUTS ARE AVAILABLE TO SWEEP RADAR INDICATOR.
38. EXT CONNECTOR	INPUT CONNECTOR FOR EXTERNAL 2 TO 50 VOLT PEAK PULSE USED TO TRIGGER START OF RANGE DELAY IN EXT (+) AND EXT (-) MODULATION MODES (42).
39. DLYD SYNC CONNECTOR	OUTPUT FOR DELAYED SYNC PULSE WITH LEADING EDGE COINCIDENT WITH END OF RANGE DELAY. DELAYED SYNC PULSE IS GENERATED FOR 1 THRU 9 AND AUX POSITIONS OF RANGE RINGS SELECTOR (2).
40. SYNC CONNECTOR	OUTPUT FOR SYNC PULSE WITH LEADING EDGE COINCIDENT WITH START OF RANGE DELAY.
41. LINE SWITCH	PUSH-ON/PUSH-OFF SWITCH USED TO APPLY POWER TO THE TEST SET.
42. MODULATION MODE SELECTORS	PUSHBUTTON SELECTORS USED TO SELECT MODE FOR STARTING SIMULATED RETURN DELAY. TRACK SELECTOR STARTS DELAY AT LEADING EDGE OF MAGNETRON PULSE FROM R/T UNIT CONNECTED TO RF CONNECTOR (31).



CONTROL/INDICATOR/CONNECTOR	FUNCTION
46. AC CONNECTOR	INPUT CONNECTOR FOR 115/230 VOLTS AC 50 TO 400 HZ, 150 WATTS LINE.
47. FUSE HOLDER	HOLDS MDL-1 FUSE.
48. SPECTRUM ANALYZER CONNECTOR	PROVIDES ATTENUATED RADAR SIGNAL FOR A SPECTRUM ANALYZER.



CONTROL/INDICATOR/CONNECTOR	FUNCTION
49. AUX RANGE CONTROL	PROVIDES CONTINUOUSLY VARIABLE DELAY OF SIMULATED RETURN FROM 2.1 TO 29.5 µS (0.17 TO 2.4 NM) WHEN AUX RANGE RINGS (2) IS SELECTED.
50. µS/MILES SWITCH	SELECTS UNITS OF RANGE SELECTOR (1) DELAY IN MICROSECONDS OR NAUTICAL MILES.
51. PWR/DISC SWITCH	THE POWER/DISCRIMINATOR FREQUENCY SWITCH CONTROLS THE FUNCTION OF PANEL METER (54). PWR POSITION, THE METER INDICATES THE PEAK PULSE OUTPUT POWER OF THE UNIT-UNDER-TEST. WHEN THE PWR/DISC SWITCH IS IN DISC, THE METER INDICATES IF THERE IS A FREQUENCY DIFFERENCE BETWEEN THE MAGNETRON AND THE TEST SET SIGNAL GENERATOR.
52. ZERO CONTROL	THE ZERO CONTROL IS USED IN CONJUNCTION WITH THE TEST SWITCH (53) TO ALIGN THE FREQUENCY OF THE RD-300 WITH THE FREQUENCY OF THE UNIT-UNDER-TEST.

CONTROL/INDICATOR/CONNECTOR	FUNCTION
53. TEST SWITCH	A PUSHBUTTON SWITCH WHICH ACTIVATES A 30 MHZ TEST SIGNAL USED IN ALIGNING THE FREQUENCY OF THE RD-300 WITH THE FREQUENCY OF THE UNIT-UNDER-TEST. THE PANEL METER (54) INDICATION IS ZEROED, THROUGH THE USE OF THE ZERO CONTROL (52), WHILE THE TEST SWITCH IS DEPRESSED. THE METER INDICATION IS PROPERLY ALIGNED WITH THE RADAR R/T UNIT FREQUENCY WHEN THE PANEL METER (54) INDICATES THE SAME READING WITH OR WITHOUT THE TEST SWITCH BEING ACTIVATED.
54. PANEL METER	METER USED TO INDICATE MAGNETRON PEAK POWER OR TO SHOW THE PRESENCE OF A FREQUENCY OFFSET BETWEEN THE MAGNETRON AND THE SIGNAL GENERATOR. WHEN PWR/DISC SWITCH (51) IS IN PWR, THE KW SCALE OF THE METER INDICATES THE PEAK RF POWER OF THE MAGNETRON OVER A RANGE OF 1 TO 12 KW. IF AN EXTERNAL 10 DB COAXIAL ATTENUATOR IS ATTACHED TO THE WAVEGUIDE DIRECTIONAL COUPLER A RANGE OF 10 TO 120 KW MAY BE MEASURED WITH THE PWR/DISC SWITCH (51) AT PWR. NOTE: CALIBRATION DEPENDS ON CROSSGUIDE COUPLER AND COAX CABLE LOSSES AND IS ONLY VALID WHEN THE TEST SET IS USED WITH ITS SERIALIZED COUPLER AND CABLE. TEST SET MUST BE RECALIBRATED IF REPLACEMENT COUPLER OR CABLE IS TO BE USED. WHEN PWR/DISC SWITCH (51) IS IN DISC, THE PANEL METER (54) INDICATES WHETHER A FREQUENCY OFFSET EXISTS BETWEEN THE MAGNETRON AND THE SIGNAL GENERATOR.

CONTROL/INDICATOR/CONNECTOR	FUNCTION
55. PRF/RF SWITCH	USED TO CONTROL FUNCTION OF DIGITAL DISPLAY (12). PRF POSITION ALLOWS DIGITAL DISPLAY TO DISPLAY PRF OF INTERNAL OSCILLATOR, MAGNETRON, OR EXTERNAL MODULATION INPUT. RF POSITION ALLOWS DIGITAL DISPLAY (12) TO INDICATE RF, IF OR MARKER FREQUENCIES.
56. BASELINE CLIPPER SCREWDRIVER ADJUST	FINE ADJUSTMENT OF THE INTERNAL FUNCTION OF THE 30 MHZ DISCRIMINATOR.

3-1. The following paragraphs supplement the radar unit manufacturer's test procedures and demonstrate the capabilities of the RD-300 Radar Test Set. The procedures should be used in conjunction with manufacturer's procedures. Each procedure is complete within itself. Only those controls which have a direct effect on the procedure are called out. Other controls are internally disabled or have no effect on the outcome of the procedure.

3-2. The operator must be familiar with the RD-300 controls, indicators, and connectors and their functions as described in Figure 3-1. All control settings are for the Test Set unless otherwise noted. The Test Set should be turned on and have a short time to stabilize before testing is begun.

3-3. An oscilloscope is the only additional test equipment required with the RD-300. Provisions should be made at the test bench for oscilloscope monitoring of the video signal from the radar R/T unit. If no control settings are specified for the oscilloscope, the operator should set the controls for a suitable display.

3-4. An antenna and servo mechanism are not required for testing the radar R/T unit. The RD-300 Test Set has provisions for an antenna simulator which will sweep the indicator display. Refer to paragraph 3-21 for Antenna Simulator Connections.

3-5. In Test Sets with serial numbers 96 to 99 and 101 to 108 the ZERO offset needs to be set only once after the Test Set has been turned on and may be checked periodically thereafter. There is no need to adjust the ZERO offset for each procedure if the procedures are performed consecutively.

3-6. NOTE

The following procedures are applicable to all RD-300 Radar Test Sets unless otherwise noted. An instruction in brackets, [], are applicable only to sets with serial numbers 96 to 99 and 101 to 108 and should be used instead of the instruction which preceeds it.

In test sets with serial numbers 96 to 99 and 101 to 108 the discriminator must be manually adjusted to zero the frequency error. The instruction [Zero Discriminator] requires that the following steps be performed.

1. Wait for TRACK Indicator (28) to come on.
2. Note reading on DISC scale of Test Set Panel Meter (8).
3. Press TEST Switch and adjust ZERO Control until meter indication corresponds to the reading noted in step 2.

3-7. PEAK POWER MEASUREMENT

DESCRIPTION: The peak power output to the radar R/T unit is measured directly from the Panel Meter (8) on the front panel of the Test Set.

PROCEDURE:

1. Connect Test Set to R/T unit per Figure 3-2.
2. Set PWR/ΔF [PWR/DISC] control (7) to PWR position.
3. Read peak power measurement on Panel Meter (8).

3-8. MAGNETRON FREQUENCY MEASUREMENT

DESCRIPTION: The frequency of the magnetron of the radar R/T unit is measured directly from the Digital Display (12) on the Test Set.

PROCEDURE:

1. Connect Test Set to R/T unit per Figure 3-2.
2. Set controls as follows:

   RF/IF Mode (25) . . . . . TRACK

   MODULATION Mode (42). . . . . TRACK

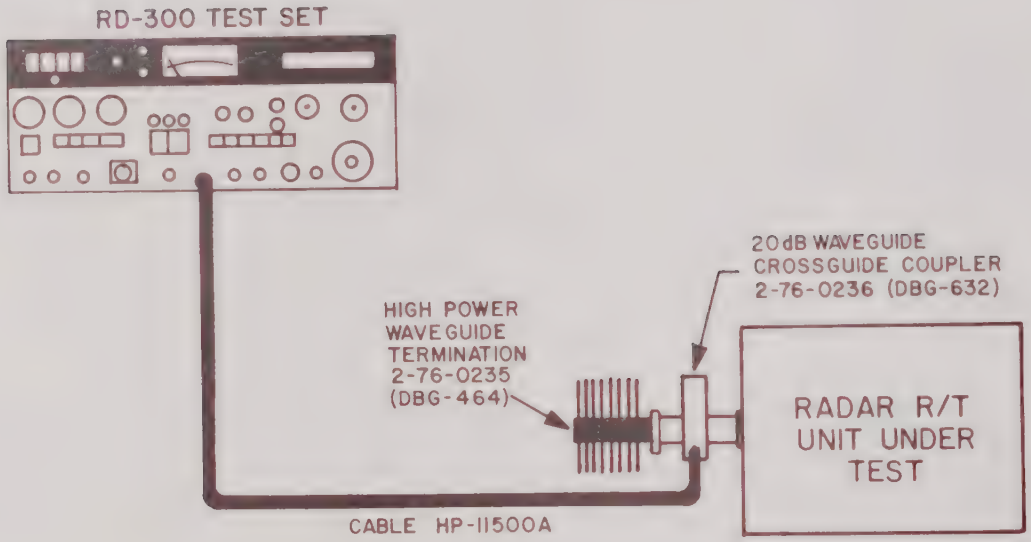
   PRF/RF (11) . . . . . RF

   ΔF (6). . . . . Cal (detent)
   [PWR/DISC . . . . . DISC]

3. Note that TRACK Indicator (28) comes on. [Zero Discriminator]
4. Read magnetron frequency directly from Digital Display (12).

3-9. PULSE REPETITION FREQUENCY MEASUREMENT

DESCRIPTION: The PRF of the radar R/T unit is measured directly on the Digital Display (12) on the Test Set.



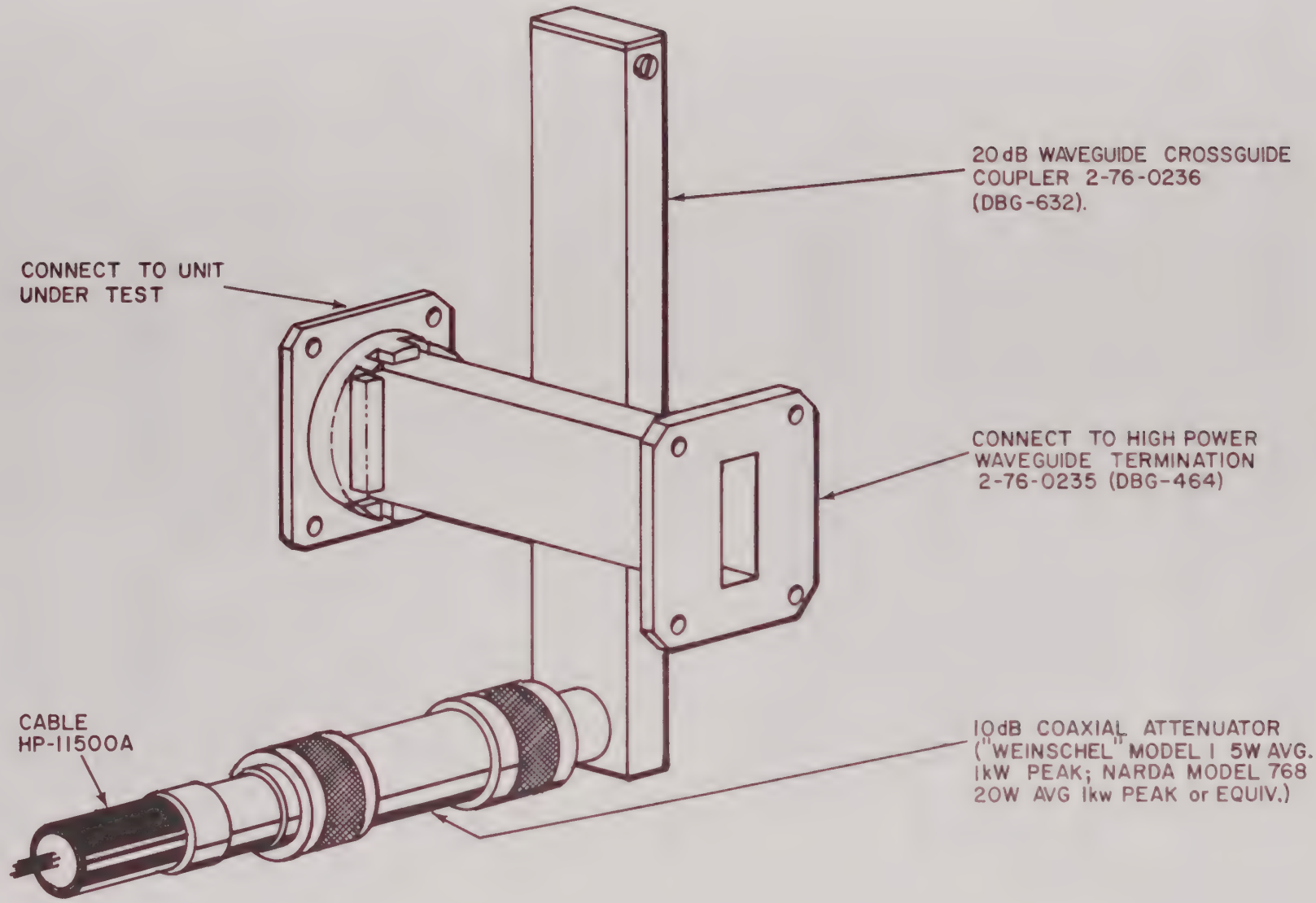
CAUTION

ATTENUATOR CONNECTION PER SHEET 2 MUST BE USED FOR R/T UNITS ABOVE 12KW AND BELOW 120KW.

NOTE

See Sheet 2 For Attenuator Connection For 12 To 120KW R/T Units.

Figure 3-2 Normal Operating Setup (Sheet 1 of 2)



ATTENUATOR CONNECTION FOR 12 TO 120 kW RADAR SETS

Figure 3-2 Normal Operating Setup (Sheet 2 of 2)

3-9. PULSE REPETITION FREQUENCY MEASUREMENT (cont'd)

PROCEDURE:

1. Connect Test Set to R/T unit per Figure 3-2.
2. Set PRF/RF Switch (11) to PRF position.
3. Read PRF directly from Digital Display (12).

3-10. RECEIVER SENSITIVITY MEASUREMENT

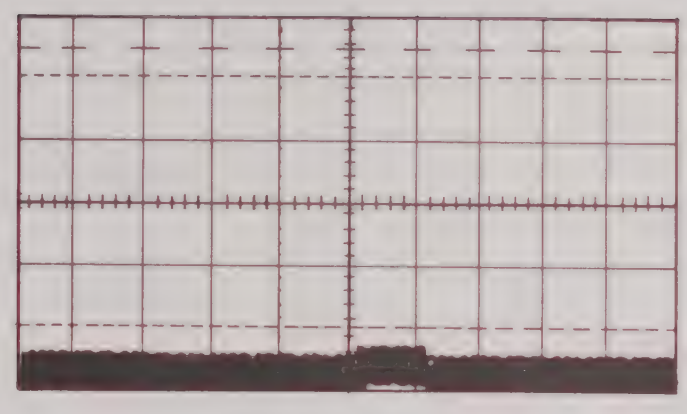
DESCRIPTION: The sensitivity of the radar receiver is measured by applying a controlled signal level to the receiver and monitoring the receiver video to determine the Minimum Discernable Signal (MDS) or Tangential Sensitivity Signal (TGS).

PROCEDURE:

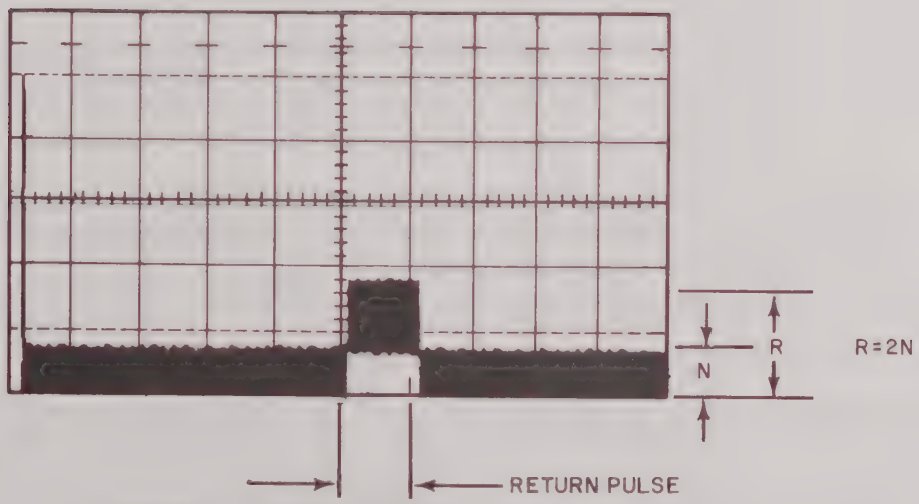
1. Connect Test Set to R/T unit per Figure 3-2.
2. Set Controls as follows:

RF/IF Mode (25)	TRACK
MODULATION Mode (42)	TRACK
RANGE RING (2)	1
ΔF (6)	Cal (detent)
[PWR/DISC	DISC]

3. Note that TRACK Indicator (28) comes on. [Zero Discriminator]
4. Adjust WIDTH μs Control (43) and Range Selector (1) for desired pulse width and range delay. If a pulse wider than 30 μs is desired, 270 μs pulse is available by adjusting the CONTOUR dB Control (14), out of detent, to 0 dB position.
5. Connect oscilloscope to monitor receiver video. Trigger scope from DLYD SYNC Connector (39) on Test Set.
6. Use OUTPUT dB Control (13) and OUTPUT dBm Control (18) to lower output of Test Set until oscilloscope response is just discernable (MDS) or until simulated return pulse just rises above the noise level (TGS) as shown in Figure 3-3. Receiver sensitivity is then read directly from the OUTPUT Control dials (13 & 18).



MINIMUM DISCERNABLE SIGNAL
(MDS)



TANGENTIAL SENSITIVITY SIGNAL
(TGS)

FIG. 3-3 RECEIVER SENSITIVITY OSCILLOSCOPE DISPLAY

3-11. CONTOUR THRESHOLD MEASUREMENT

DESCRIPTION: The output of the Test Set is set to the level to which the contour level of the R/T is referenced (MDS or TGS). The output level is then increased until the contour threshold is reached and the level above the reference is read directly off the dial.

PROCEDURE:

1. Connect Test Set to R/T unit per Figure 3-2.

2. Set controls as follows:

   RF/IF Mode (25). . . . . TRACK

   MODULATION Mode (42) . . . . . TRACK

   ΔF (6) . . . . . Cal (detent)
   [PWR/DISC. . . . . DISC]

   RANGE RING (2) 1

3. Note that TRACK Indicator (28) comes on. [Zero Discriminator]

4. Set Range Selector (1) to a range delay which will position simulated return beyond STC range.

5. Set Test Set OUTPUT controls (13 & 18) for output level corresponding to level of reference for contour threshold (MDS or TGS). See Paragraph 3-10.

6. According to manufacturer's recommendations or standard practices, monitor the video on an oscilloscope or monitor the radar indicator display in order to determine when the contour level is reached.

7. Adjust the CONTOUR dB Control (14) until the contour level is reached. Read contour threshold level from CONTOUR dB Control (14) dial.

3-12. RECEIVER IF BANDWIDTH MEASUREMENT

DESCRIPTION: The Test Set is used to track magnetron frequency and to offset the return signal frequency while monitoring the radar R/T video or indicator to determine the frequencies at which the video level is 3 dB down from maximum. The bandwidth is then the difference between the frequencies of the upper and lower -3 dB points.

3-12. RECEIVER IF BANDWIDTH MEASUREMENT (cont'd)

PROCEDURE:

1. Connect Test Set to R/T unit per Figure 3-2.

2. Set controls as follows:

   RF/IF Mode (25). . . . . .TRACK

   MODULATION Mode (42) . . . . . .TRACK

   RANGE RING (2). 1

   PWR/ΔF (7) . . . . . .ΔF
   [PWR/DISC. . . . . .DISC]

   ΔF (6) . . . . . .Cal (detent)

3. Note that TRACK Indicator (28) comes on. [Zero Discriminator]

4. Set Range Selector (1) to a range delay which will position simulated return beyond STC range.

5. Connect oscilloscope to monitor R/T unit video signal and trigger scope from DLYD SYNC Connector (39) on Test Set.

6. Set OUTPUT Controls (13 & 18) for output level of approximately 25 dB above MDS.

7. Set OUTPUT Controls (13 & 18) to 3 dB below present setting and mark the level on the oscilloscope as reference. Set OUTPUT controls (13 & 18) back to initial setting. For a digital indication, adjust the OUTPUT Controls (13 & 18) until the simulated return is between two intensity levels and use this indication as the reference level. Increase the attenuator output by 3 dB.

8. Adjust ΔF Control (6) until Panel Meter (8) indicates in the negative portion of the scale and signal level matches the -3 dB reference level established in Step 7. Record ΔF indication on Panel Meter (8). [Adjust ZERO Control ccw until signal level on scope matches the -3 dB reference level established in Step 8. Record magnetron frequency as displayed on Digital Display (12).]

   _____MHz

   [_____MHz]

3-12. RECEIVER IF BANDWIDTH MEASUREMENT (cont'd)

PROCEDURE:

9. Adjust ΔF control (6) until Panel Meter (8) indicates in the positive portion of the scale and the signal level matches the -3 dBm reference level established in Step 7. Record ΔF indication on Panel Meter (18). [Adjust ZERO Control cw until signal level on scope peaks and decreases to match the -3 dB reference level established on Digital Display (12)].

_____MHz

10. Calculate bandwidth by adding the ΔF frequency offsets recorded in Steps 8 and 9. [Calculate bandwidth by substracting frequency recorded in Step 8 from frequency recorded in Step 9.]

_____MHz
[_____MHz]

3-13. AFC (Automatic Frequency Control) CENTERING TEST

DESCRIPTION: The Test Set is used to track the magnetron frequency and to offset the return signal frequency while monitoring the radar R/T video or indicator to determine the -3 dB point frequencies of the receiver and check that they are centered about the magnetron frequency.

PROCEDURE:

1. Connect Test Set to R/T unit per Figure 3-2.

2. Set controls as follows:

RF/IF Mode (25). . . . . .TRACK

MODULATION Mode (42) . . . . . .TRACK

RANGE RING (2) 1

PRF/RF (11). . . . . .RF

PWR/ΔF (7) . . . . . .ΔF
[PWR/DISC. . . . . .DISC]

ΔF (6) . . . . . .Cal (detent)

3. Note that TRACK Indicator (28) comes on. [Zero Discriminator]

3-13. AFC CENTERING TEST (cont'd)

PROCEDURE:

4. Set Range Selector (1) to a range delay which will position simulated return beyond STC range.

5. Connect oscilloscope to monitor R/T unit video signal and trigger scope from DLYD SYNC Connector (39) on Test Set.

6. Set OUTPUT Controls (13 & 18) for output level of approximately 25 dB above MDS. Observe return pulse on scope.

7. Set OUTPUT Controls (13 & 18) to 3 dB below present setting. Note that output level on scope is now 3 dB down from maximum level, and set controls back to initial settings. For a digital indication, adjust the OUTPUT Controls (13 & 18) until the simulated return is between two intensity levels and use this indication as the reference level. Increase the OUTPUT dB Control (13) output by 3 dB. [Record magnetron frequency as displayed on Digital Display (12).]

_____MHz

[_____MHz]

8. Adjust ΔF Control (6) until Panel Meter (8) indicates in the negative portion of the scale and signal level matches the level which is 3 dB down. Record ΔF indication on Panel Meter (8). [Adjust ZERO Control ccw until output level on scope matches the level which is 3 dB down. Record magnetron frequency as displayed on Digital Display (12).]

Lower -3 dB point:_____MHz

[_____MHz]

9. Adjust ΔF Control (6) until Panel Meter (8) indicates in the positive portion of the scale and signal level matches the reference -3 dB down level. Record ΔF indication on Panel Meter (8). [Adjust ZERO Control cw until output level on scope reaches a peak and then decreases back down to the -3 dB down level. Record magnetron frequency as displayed on Digital Display (12).]

Upper -3 dB point:_____MHz

[_____MHz]

3-13. AFC CENTERING TEST (cont'd)

PROCEDURE:

10. The difference between the positive and negative ΔF indications is the AFC centering error. If the centering is not within the manufacturer's tolerance, perform the procedures in Paragraph 3-14. If the centering is within the manufacturer's tolerance, go directly to Paragraph 3-15. [Calculate the average frequency for the two frequencies recorded in Steps 8 and 9. If this frequency matches the frequency recorded in Step 7, the AFC is centered. If the frequencies do not match follow Paragraph 3-14.]

3-14. AFC CENTERING ADJUSTMENT

DESCRIPTION: The Test Set is used as a signal generator which will track the magnetron frequency while the AFC is adjusted for maximum sensitivity.

PROCEDURE:

1. Connect Test Set to R/T unit per Figure 3-2.

2. Set controls as follows:

   RF/IF Mode (25). . . . . .TRACK

   MODULATION Mode (42) . . . . . .TRACK

   ΔF (6) . . . . . .Cal (detent)
   [PWR/DISC. . . . . .DISC]

   RANGE RING (2) 1

3. Note that TRACK Indicator (28) comes on. [Zero Discriminator]

4. Set Range Selector (1) to a range delay which will position simulated return beyond STC range.

5. Connect oscilloscope to monitor R/T unit video signal and trigger scope from DLYD SYNC Connector (39) on Test Set.

6. Set OUTPUT Controls (13 &18) for output level just above MDS.

7. Adjust AFC centering control on R/T unit for maximum video signal level as observed on the oscilloscope.

3-15. DIGITAL VIDEO LEVEL THRESHOLD MEASUREMENTS

DESCRIPTION: The output of the Test Set is varied to simulate different levels of signal return and to determine the points referenced to MDS or TGS at which different digital video levels are reached.

PROCEDURE:

1. Connect Test Set to R/T unit per Figure 3-2.

2. Set controls as follows:

   RF/IF Mode (25). . . . . .TRACK

   MODULATION Mode (42) . . . . . .TRACK

   ΔF (6) . . . . . .Cal (detent)
   [PWR/DISC. . . . . .DISC]

   RANGE RING (2) 1

3. Note that TRACK Indicator (28) comes on. [Zero Discriminator]

4. Set Range Selector (1) to a range delay which will position simulated return beyond STC range.

5. Set OUTPUT Controls (13 & 18) for output level corresponding to level of reference for video levels (MDS or TGS).

6. According to manufacturer's recommendations or standard practices, monitor the video A/D level circuitry or the radar indicator display to determine the transition points between the video levels.

7. Adjust the CONTOUR dB Control (14) until a video level transition is noted and read the threshold level, above reference, directly from the CONTOUR dB Control (14) dial. Repeat until all transition levels have been determined.

3-16. RANGE RING CHECK

DESCRIPTION: To check the accuracy the Test Set is used to generate precision range rings which are compared with the rings generated by the indicator. The start of the range delay is triggered from the leading edge of the magnetron pulse.

PROCEDURE:

1. Connect Test Set to R/T unit per Figure 3-2.
2. Set controls as follows:

   RF/IF Mode (25). . . . . TRACK

   MODULATION Mode (42) . . . . . TRACK

   ΔF (6) . . . . . Cal (detent)
   [PWR/DISC. . . . . DISC]

   μs/NM (45) . . . . . NM

3. Note that TRACK Indicator (28) comes on. [Zero Discriminator]
4. Use WIDTH μs Control (43) to adjust pulse width as desired.
5. Select range to be tested on radar indicator.
6. Set RANGE RING Selector (2) to correspond to number of range rings on indicator.
7. Adjust Range Selector (1) until Test Set range rings are superimposed over indicator range rings. Check that distance between range rings indicated on Range Selector (1) corresponds to specified distance between indicator range rings.

3-17. TRANSMITTER PULSE MEASUREMENTS

DESCRIPTION: An oscilloscope is attached to the DET Connector (24) and the transmitter pulse width is measured at the 50% amplitude points.

PROCEDURE:

1. Connect Test Set to R/T unit per Figure 3-2.
2. Connect oscilloscope to DET Connector (24) on Test Set and trigger from SYNC connector (41). Waveform on scope should be similar to Figure 3-4.

3-17. TRANSMITTER PULSE MEASUREMENTS (cont'd)

PROCEDURE:

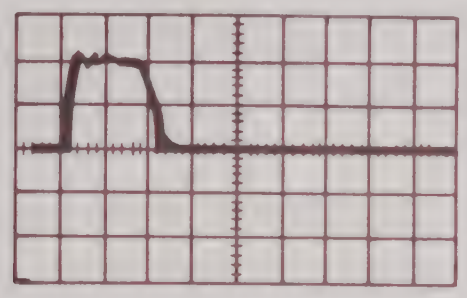


Figure 3-4. Detector Output Waveform

3. Examine pulse shape for evidence of mode skipping or mode splitting as indicated in Figure 3-5. These waveforms indicate that the magnetron is not functioning properly or that the magnetron is not being modulated properly.

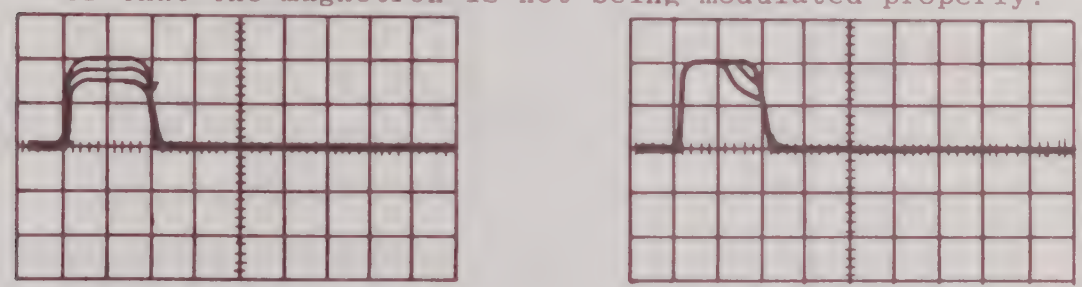


Figure 3-5. Detector Output Waveforms for Faulty Transmitters[1]

4. Measure pulse width at 50% amplitude points.

5. Check that flatness variation across top of waveform is 20% or less of mean pulse amplitude.

6. Measure rise time, 10 to 90%, and fall time, 90 to 10%.

[1] Instruction Manual AVQ-20 Weather Radar, Radio Corporation of America: Los Angeles, CA., July 31, 1964, p. 709.

3-18. MAGNETRON PUSHING OR PULLING MEASUREMENTS

DESCRIPTION: The DISC OUT Connector (20) is used to monitor magnetron pulse frequency versus time characteristics on an attached oscilloscope. The oscilloscope display will show magnetron "pushing" or "pulling".

PROCEDURE:

1. Connect Test Set to R/T unit per Figure 3-2.

2. Set controls as follows:

   RF/IF Mode (25). . . . . .TRACK

   MODULATION Mode (42) . . . . . .TRACK

   ΔF (6) . . . . . .Cal (detent)
   [PWR/DISC. . . . . .DISC]

3. Note that TRACK Indicator (28) comes on. [Zero Discriminator]

4. Connect oscilloscope input to DISC OUT Connector (20). Terminate cable in 50 ohms at scope.

5. Trigger oscilloscope from SYNC Connector (40).

6. FM During Pulse (frequency pushing from incorrect modulator pulse):
   Examine oscilloscope display for evidence of magnetron frequency modulation. Frequency modulation is characterized by a slope in the top of the waveform. The magnitude of the modulation can be determined using the vertical calibration factor of 0.1 Volts/MHz. See Figure 3-6.

Figure 3-6. Magnetron Frequency Modulation Discriminator Waveforms.

3-18. MAGNETRON PUSHING OR PULLING MEASUREMENTS. (cont'd)

PROCEDURE:

7. Note magnetron frequency on Digital Display (12).

8. Select RF MAN Mode on the RF/IF Mode Selectors (25) and adjust MAN FREQ Controls (10) to correspond to magnetron frequency noted in Step 7.

9. Frequency Pulling Due to Antenna Impedance Variations:

   With the antenna scan system operating, observe the behavior of the discriminator pulse. As the antenna rotates, watch for a periodic shift up and down or "breathing" effect in the display. This is magnetron "pulling", which is a shift in operating frequency as the magnitude or phase of the load impedance reflection coefficient varies throughout the antenna scan. The pulling effect can be calculated as noted in Figure 3-7.

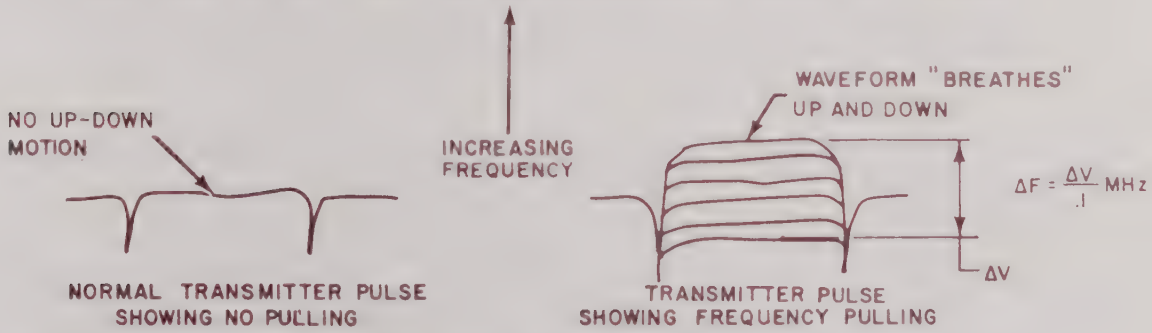


Figure 3-7. Magnetron Frequency Pulling Discriminator Waveform

3-19. SENSITIVITY TIME CONSTANT (STC) MEASUREMENTS

DESCRIPTION: The Test Set is used to generate a RF or IF pulse, with the pulse width and range delays specified by the radar maintenance procedures, to verify a decrease in receiver sensitivity at short range delays.

The Test Set can generate RF or IF pulses of variable width, 0.2 to 30 µs, or fixed width, 270 µs, with a delay of 0 to 999 microseconds or nautical miles. The start of the pulse delay can be triggered from the leading edge of the magnetron pulse or from an external (system) trigger, or the Test Set internal PRF oscillator can be used to trigger the delay and to generate a TTL sync pulse coincident with the start of the delay to trigger the STC circuits.

3-19. SENSITIVITY TIME CONSTANT (STC) MEASUREMENTS (cont'd)

PROCEDURES:

1. Magnetron Trigger

Perform the following steps if the start of the pulse delay is to be triggered from the leading edge of the magnetron pulse. These steps can be used to generate RF or IF pulses as noted. Refer to manufacturer's maintenance or service manual for detailed test procedures.

1. Connect Test Set to R/T unit per Figure 3-2. If IF pulses are required, connect a 50 ohm cable between IF output and R/T unit as required.

2. Set controls as follows:

RF/IF Mode (25)	RF TRACK (RF Pulses) IF LO (IF Pulses)
MODULATION Mode (42)	TRACK
RANGE RING (2)	1

3. Adjust MAN FREQ Controls (10) for IF frequency (if applicable).

4. Use WIDTH µs Control (43) to adjust pulse width as specified in maintenance procedures. If a wider pulse width is desired a 270 µs pulse can be generated by adjusting CONTOUR dB Control (14), out of detent, to 0 dB position.

5. Use Range Selector (1) and µS/NM [µS/MILES] Switch (45) to select pulse delays as specified in maintenance procedures.

6. Use OUTPUT Controls (13 & 18) to set output level as specified in maintenance procedures.

7. If oscilloscope is used for measurements, trigger time base from DLYD SYNC Connector (39).

8. Verify decrease in receiver sensitivity at short range delays per maintenance specifications.

2. External Trigger

Perform the following steps if the start of the pulse delay is to be triggered from the system trigger pulse. These steps can be used to generate RF or IF pulses as noted. Refer to manufacturer's maintenance or service manual for detailed test procedures.

3-19. SENSITIVITY TIME CONSTANT (STC) MEASUREMENTS (cont'd)

PROCEDURES:

1. Connect Test Set to R/T unit per Figure 3-2. If IF pulses are required, connect 50 ohm cable between IF output and R/T unit as required.

2. Set controls as follows:

   RF/IF Mode (25). . . . . RF TRACK (RF Pulses)
   IF LO (IF Pulses)

   RANGE RING (2) 1

3. Adjust MAN FREQ Controls (10) for IF frequency (if applicable).

4. Connect system trigger to EXT Connector (38).

5. Select EXT (+), for positive-going system trigger, or EXT (-), for negative-going system trigger, MODULATION Mode Selector (42).

6. Use WIDTH µs Control (43) to adjust pulse width as specified in maintenance procedures. If a wider pulse width is desired, a 270 µs pulse can be generated by adjusting CONTOUR dB Control (14), out of detent, to 0 dB position.

7. Use Range Selector (1) and µS/NM [µS/MILES] Switch (45) to select pulse delays as specified in maintenance procedures.

8. Use OUTPUT Controls (13 & 18) to set output level as specified in maintenance procedures.

9. If oscilloscope is used for measurements, trigger time base from DLYD SYNC Connector (39).

10. Verify decrease in receiver sensitivity at short range delays per maintenance specifications.

3. Internal Trigger

Perform the following steps if the internal PRF oscillator is to be used to start the pulse delay and trigger STC circuits. These steps can be used to generate RF or IF pulses as noted. Refer to manufacturer's maintenance or service manual for detailed test procedures.

3-19. SENSITIVITY TIME CONSTANT (STC) MEASUREMENTS (cont'd)

PROCEDURES:

1. Set controls as follows:

   RF/IF Mode (25). . . . . .RF MAN (RF Pulses)
   IF LO (IF Pulses)

   MODULATION Mode (42) . . . . . .INT

   RANGE RING (12). 1

2. For RF operation, connect test set to R/T unit per Figure 3-2. For IF operation, connect 50 ohm cable between IF Output Connector (26) and circuit under test.

3. Set PRF/RF Switch (11) to RF position and adjust MAN FREQ Control (10) for desired frequency (RF or IF).

4. Use SYNC Connector (40) to trigger circuit under test at start of pulse delay, (SYNC level is standard TTL behind 220 ohm source resistance).

5. Set PRF/RF Switch (11) to PRF position and adjust PRF Hz Control (44) for frequency specified in maintenance procedure.

6. Use WIDTH µs control (43) to adjust pulse width as specified in maintenance procedures. If a wider pulse width is desired a 270 µs pulse can be generated by adjusting CONTOUR dB Control (14), out of detent, to 0 dB position.

7. Use Range Selector (1) and µS/NM [µS/MILES] Switch (45) to select pulse delays as specified in maintenance procedure.

8. Use OUTPUT Controls (13 & 18) to set output level as specified in maintenance procedure.

9. If oscilloscope is used for measurements, trigger time base from DLYD SYNC Connector (39).

10. Verify decrease in receiver sensitivity at short range delays per maintenance specifications.

3-20. IF TESTING

DESCRIPTION: IF testing can be accomplished using the Continuous Wave (CW), Sweep, or Pulse Modulated Generator functions built into the Test Set. The Pulse Modulated Generator can be triggered internally by the PRF oscillator or by external trigger pulses. Refer to manufacturer's manual for testing procedures.

PROCEDURES:

1. CW Generator

    1. Select IF LO (-20 to -132 dBm) or IF HI (+20 to -92 dBm) mode on the RF/IF Mode Selectors (25).

    2. Select CW Mode on the MODULATION Mode Selectors (42).

    3. Use OUTPUT Controls (13 & 18) to set desired output level.

    4. Set PRF/RF (11) Switch to RF position and adjust MAN FREQ Controls (10) for desired frequency.

    5. Output is available from IF Output Connector (26).

2. Externally Triggered Pulse Modulated Generator.

    1. Select IF LO (-20 to -132 dBm) or IF HI (+20 to -92 dBm) mode on the RF/IF Mode Selectors (25).

    2. Set PRF/RF Switch (11) to RF position and adjust MAN FREQ Controls (10) for desired frequency.

    3. Set OUTPUT Controls (13 & 18) to desired output level.

    4. Adjust WIDTH µs Control (43) for desired pulse widtn.

    5. Select 1 on the RANGE RING Selector (2).

    6. Use Range Selector (1) and µS/NM [µS/MILES] Switch (45) to set pulse delay.

    7. Select EXT (+), if external trigger is positive-going, or EXT (-), if external trigger is negative-going, on MODULATION Mode Selectors (42).

    8. Connect external trigger to EXT Connector (38).

    9. Trigger oscillosoope from DLYD SYNC Connector (39).

    10. Output is available from IF Output Connector (26).

3-20. IF TESTING (cont'd)

PROCEDURES:

3. Internally Triggered Pulse Modulated Generator

1. Select IF LO (-20 to -132 dBm) or IF HI (+20 to -92 dBm) mode on the RF/IF Mode Selector (25).

2. Select INT Mode on the MODULATION Mode Selectors (42).

3. Set PRF/RF Switch (11) to RF position and adjust MAN FREQ Controls (10) for desired frequency.

4. Set PRF/RF Switch (11) to PRF position and adjust PRF Hz Control (44) for desired pulse repetition frequency.

5. Set OUTPUT Controls (13 & 18) to desired output level.

6. Adjust WIDTH μs Control (43) for desired pulse width.

7. Trigger oscilloscope from DLYD SYNC Connector (39).

8. Output is available from IF Output Connector (26).

4. Sweep Generator (including Marker)

1. Select IF LO (-20 to -132 dBm) or IF HI (+20 to -92 dBm) mode on RF/IF Mode Selectors (25).

2. Adjust SWP WIDTH MHz Control (3) to desired sweep width.

3. Set PRF/RF Switch (11) to RF position and adjust MAN FREQ Controls (10) for desired frequency.

4. Set OUTPUT Controls (13 & 18) to desired output level.

5. Select CW Mode on MODULATION Mode Selectors (42).

6. Link IF Output Connector (26) to input of IF strip or AFC system to be tested.

7. Link SCOPE SWEEP Connector (34) to horizontal input of oscilloscope.

8. Connect detected output of circuit-under-test to oscilloscope vertical input.

9. To use marker, press DISPLAY MKR Switch (29) and adjust MKR FREQ Control (9) until zero beat superimposed on detected output is positioned to the desired point. Read frequency on Digital Display (12).

3-20. IF TESTING (cont'd)

Figure 3-8. Typical IF Amplifier Video Sweep Output

3-21. ANTENNA SIMULATOR CONNECTIONS

PROCEDURES:

1. The ANT SIMULATOR Connector (37) simulates servo signals from the radar antenna to sweep the display indicator. The antenna assembly does not have to be removed from the aircraft for this test. The simulator modulates an external reference signal according to the setting of the ANGLE Selectors (33). The simulator develops outputs in three-phase synchro, two phase resolver, or linear azimuth pot formats. Table 3-1 lists the Pin Assignments for the Antenna Simulator Connector (J73). Figures 3-9 and 3-10 show typical connections for the reference inputs and simulator outputs respectively.

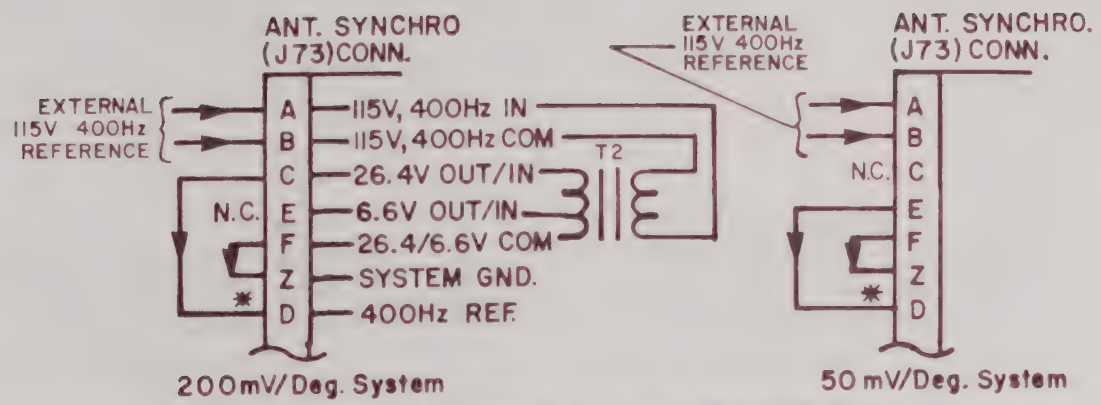
2. Figure 3-9 shows the 400 Hz reference input connections for the Antenna Gyro Simulator. The Antenna Gyro Simulator requires a 400 Hz input of 115, 26.4 or 6.6 Volts as a reference for the servo outputs. Typical connections are shown for both 200 mV/degree and 50 mV/degree servo systems using each of the possible reference input voltage combinations.

3. Synchro, resolver, and linear pot simulator output connections are shown in Figure 3-10. The synchro and resolver outputs are both referenced to the 400 Hz inputs. The azimuth pot outputs are provided for sweep systems which require a linear pot sweep (King KWX-50 or equivalent). The RD-300 simulates the sweep of a linear 1000 ohm pot with a position factor of 9.5 ohms/degree. The sweep rate for each of the three output modes is controlled by the ANT RATE Control (32) and the sweep angle is controlled by the ANGLE Selectors (33).

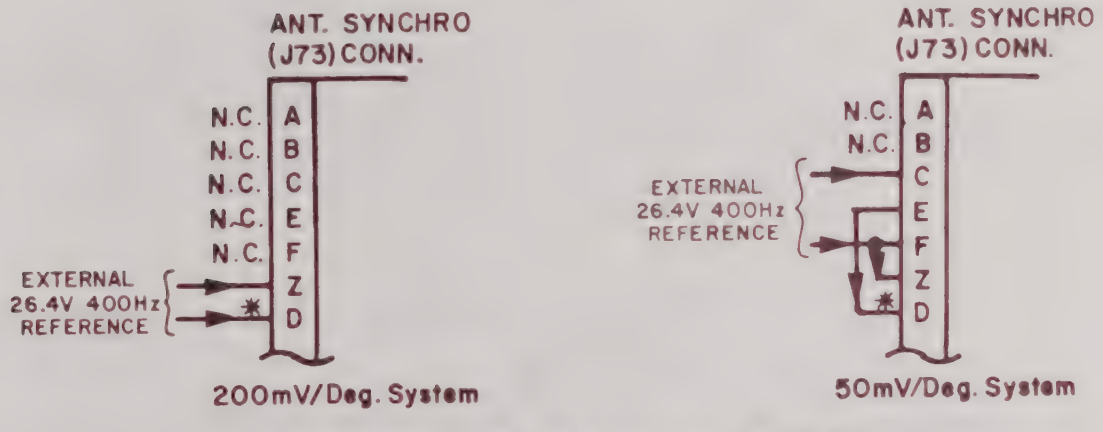
4. To achieve a phase shift in the Sine Resolver Output while testing a radar antenna stabilization platform, connect the 400 Hz reference to Pin W instead of Pin D. The Sine Resolver Output Phase Shift is 8° (+4°, -2°) with respect to the reference input.

Table 3-1. Pin Assignment for Antenna Simulator Connector (J73)

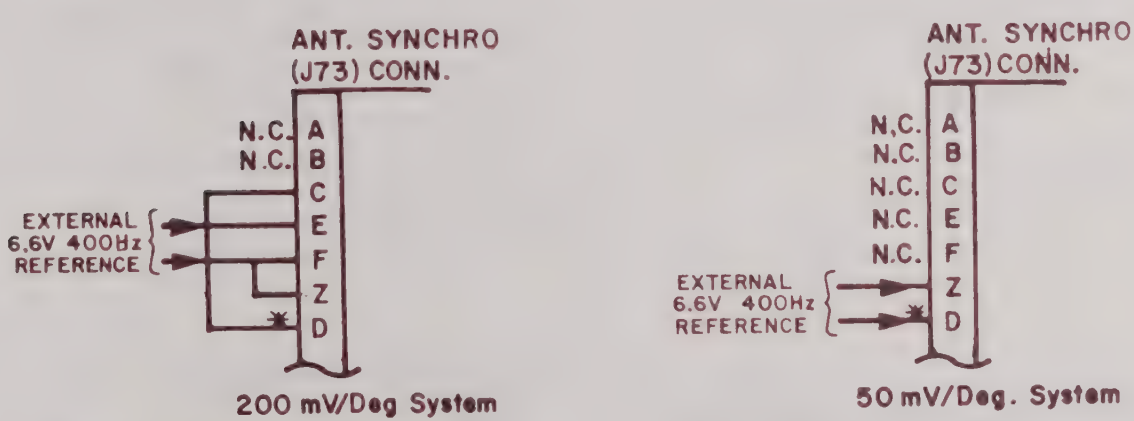
Pin	Function
A	115 V 400 Hz Input High
B	115 V 400 Hz Input Low
C	26.4 V 400 Hz Output
D	System Reference
E	6.6 V 400 Hz Common
F	26.4/6.6 V 400 Hz Common
H	Synchro Out Phase X
J	Synchro Out Phase Y
K	Synchro Out Phase Z
L	Cos Resolver Common
M	Cos Resolver Out
N	Reference Input for RCA AVQ Series Radar
P	T3-4
R	Sine Resolver Common
S	Sine Resolver Out
T	Azimuth Pot High (King Radar)
U	Azimuth Pot Low (King Radar)
V	Azimuth Pot Control (King Radar)
W	Reference Input for Sine Resolver Phase Shift
X	GND when testing AVQ-45, -46,-47
Y	Pot System GND
Z	System Ground
a	Pitch Output
b	Roll Output



EXTERNAL 115V 400Hz REFERENCE



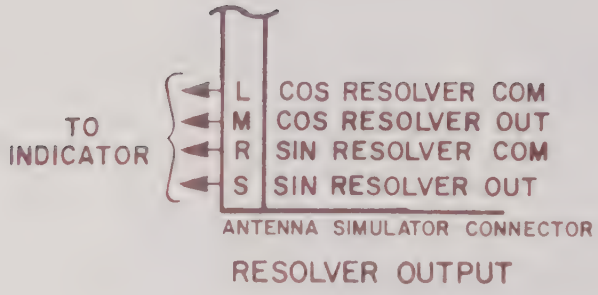
EXTERNAL 26.4V 400Hz REFERENCE



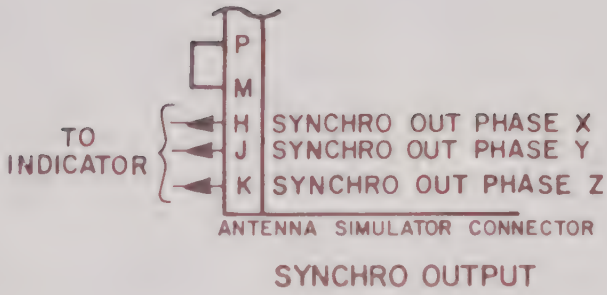
✱ FOR SW RESOLVER OUTPUT PHASE SHIFT, 400Hz REFERENCE INPUT SHOULD BE APPLIED TO PIN 'W' INSTEAD OF PIN 'D'

EXTERNAL 6.6V 400Hz REFERENCE

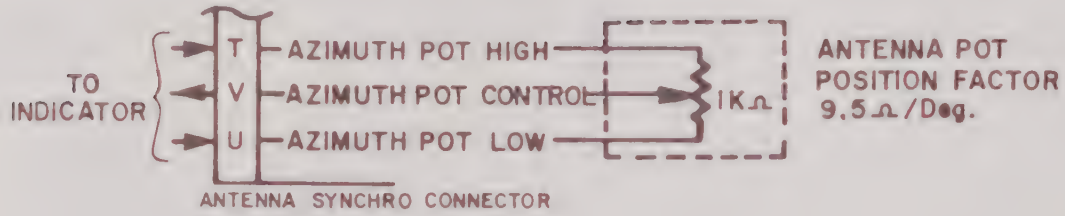
Figure 3-9 Antenna Simulator 400Hz Reference Input Connections



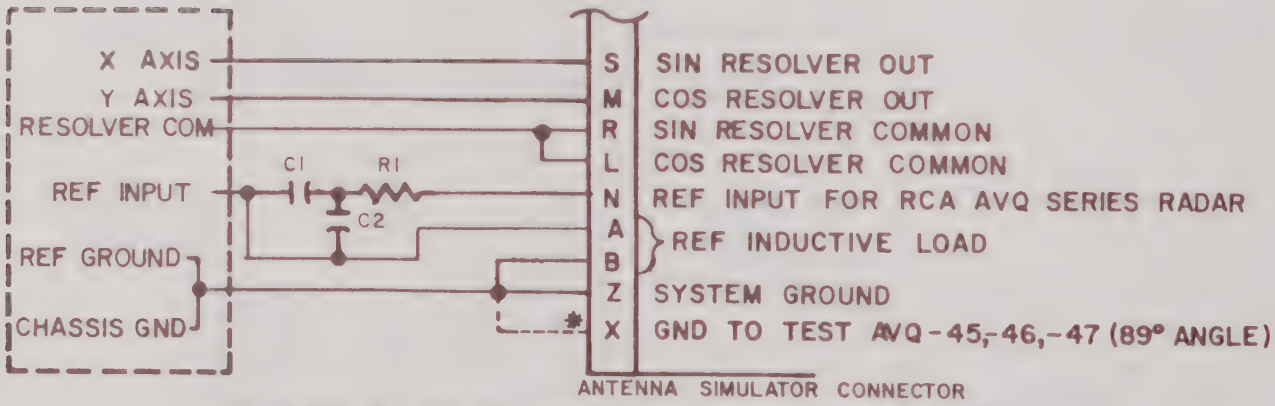
RESOLVER OUTPUT



SYNCHRO OUTPUT



LINEAR POT OUTPUT
(KING KWX-50 or SIMILAR)



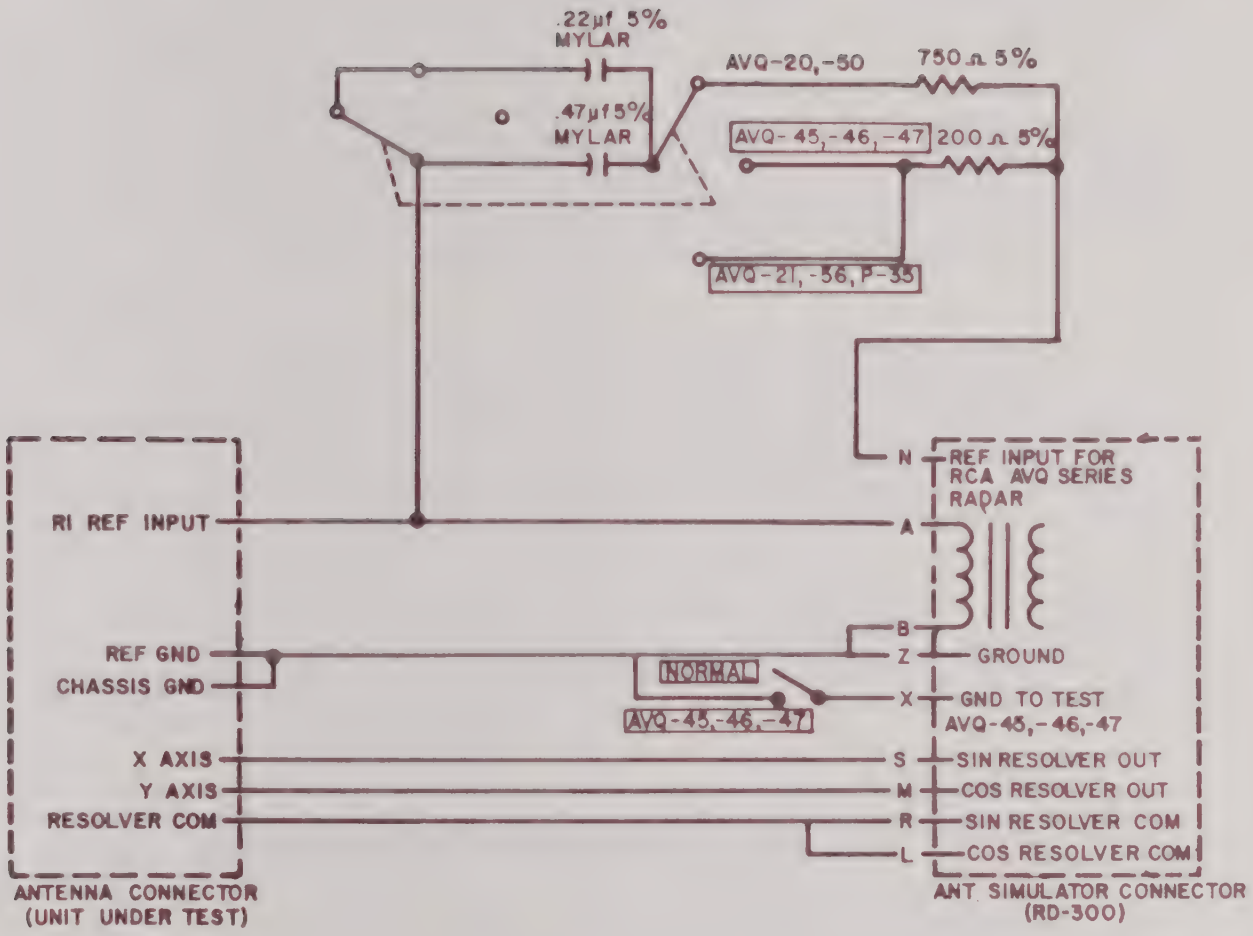
RESOLVER OUTPUT FOR RCA AVQ-SERIES RADAR

AVQ	R1 1/4W, 5%	C1 5% MYLAR	C2 5% MYLAR
-20, -55	750Ω	.47μf	.22μf
-45, -46, -47	200Ω	.47μf	.22μf
-21 -56, P-35	200Ω	.47μf	NONE

NOTE:
Set "ANGLE" selectors to 89° for AVQ-45,-46,-47 Radar.

*-USED WITH AVQ-45,-46,-47 RADARS ONLY

Figure 3-10 Antenna Simulator Output Connections



NOTE

**Set ANGLE Selectors to 89°
for AVQ-45,-46,-47 Radars.**

**Figure 3-11 Optional Switch Box Circuit For RCA Radars
(Not Supplied by IFR, INC)**

GENERAL THEORY OF OPERATION

SECTION IV

4-1. Introduction.

4-2. This section presents a general theory of operation which is consistant with Block Diagram 3-25-126 (REV. A). Specialized theories of operation for most of the schematics in this manual will be found at appropriate places in the SCHEMATIC SECTION, SECTION VIII. Refer to the appropriate theory of operation, as needed.

4-3. Operation.

4-4. The RF Signal Generator System determines the magnetron frequency of the unit under test and generates a similar frequency to within 25 kHz of the magnetron frequency. The generated frequency is made to follow any frequency drift that might occur from the magnetron. The RF Generator output is directed to the radar unit under test as a test signal. This signal is controllable in amplitude, pulse width and pulse spacing.

4-5. For the RD-300 to generate the same frequency as the radar unit is transmitting, it is necessary to sample the radar unit's output frequency and compare it to the VCO frequency generated by the RD-300. Changes in the radar units magnetron frequency are also determined by this method.

4-6. High level RF pulses from the radar under test are attenuated and mixed with the output of the 8.25 GHz Local Oscillator to produce the XMTR SAMPLE frequency which is applied to the Single Sideband Module.

4-7. The Single Sideband Module produces the 30 MHz Information and Cal pulse which are used by the 30 MHz Pulse Discriminator to control the frequency of the VCO in the TRACK Mode of operation. If the VCO frequency is more than 4 MHz from the XMTR SAMPLE Frequency, the tune output of the 30 MHz Pulse Discriminator causes the VCO to sweep to the proper frequency.

4-8. The CAL TEST DRIVE signal from the 30 MHz Pulse Discriminator causes the Single Sideband Module to output the Cal Pulse. This pulse is a 40 µs wide, 30 MHz pulse and is outputted to the 30 MHz Pulse Discriminator 40 µs after the Information pulse.

4-9. The 30 MHz Pulse Discriminator processes the mixed-down magnetron detector pulses from the X-Band Front End and the Cal and Information pulses from the Single Sideband Module. The 30 MHz Pulse Discriminator causes the L-Band VCO to sweep and then track

the mixed-down magnetron frequency. The 30 MHz Pulse Discriminator produces an output whose amplitude is proportional to the difference between the L-Band VCO frequency and the frequency of the mixed-down transmitter sample. This voltage is applied to the TUNE input of the VCO Module.

4-10. With the MAN MODE SWITCH depressed, the 30 MHz Pulse Discriminator ignores the 30 MHz Information pulse input. At this time, the tune voltage input to the VCO is controlled by the COARSE and FINE MAN FREQ CONTROLS on the Front Panel.

4-11. The power meter circuitry on the Auxiliary Board converts the detected XMTR pulses to a d.c. voltge for the POWER METER. The Power Meter System provides an analog display of peak power measurements. Radar units under test with a peak output greater than 12kW require an external 10 dB pad in series with the pulse cable from the external Directional Coupler.

4-12. The output of the VCO is leveled and contoured by circuitry in the Leveler Distribution Module of the VCO Assembly and on the Auxiliary Board. The leveled and contoured output of the VCO Assembly is applied to the Main Diode Switch via the Output Attenuators. The Main Diode Switch uses the modulation output signals from the Range and Contour Board, and the RF & AUX LEVEL CAL voltages from the Auxiliary Board to produce the modulated L-Band VCO pulses, of the proper level, used by the X-Band Front End.

4-13. The Range and Contour Board of the RD-300 develops a variety of modulation signals used to modulate the L-Band output of the VCO Module. These signals are also used to modulate the output of the IF Amplifier, and are applied to the RF MODULATION INPUT of the Main Diode Switch.

4-14. In the X-Band Front End, the L-Band output of the Main Diode Switch is mixed with the 8.25 GHz output of the Local Oscillator to produce the X-Band output used by the radar unit under test.

4-15. Selection of either the IF "lo" or IF "hi" MODE SWITCHES of the Front Panel allows the appropriate output of the IF Amplifier to pass through the stepped attenuators to the IF OUTPUT CONNECTOR on the Front Panel. Modulation characteristics of the IF signal at the IF OUTPUT CONNECTOR are the same as for the modulated VCO output of the Main Diode Switch.

4-16. The IF Sweep Oscillator provides a sweep sawtooth that may be used on an Oscilloscope's horizontal input. This sweep signal is provided to the Front Panel SCOPE SWEEP CONNECTOR WHEN the SWP WIDTH MHz CONTROL is not in the OFF, detent, position. The MARKER system is activated by depressing the DISPLAY MARKER PUSHBUTTON on the Front Panel. This adds the output of the MARKER Oscillator to the output of the IF Oscillator.

4-17. The Prescaler provides prescaled MARKER, RF and IF frequencies to the Digital Counter Assembly. Selection between RF prescaled output and IF prescaled output is controlled by the Front Panel IF MODE SELECTOR PUSHBUTTON. Selection of the prescaled MARKER frequency is accomplished by depressing the DISPLAY MARKER PUSHBUTTON on the Front Panel.

4-18. The Digital Counter Assembly provides a display of the PRF of the radar unit under test. It also provides a display of either the RD-300's prescaled IF, MARKER or L-Band VCO frequency. The counters on the Counter Board are driven by a 10 KHz clock signal from the Range and Contour Board. The Digital Counter Assembly provides the sweep ramp signal used to sweep the IF Oscillator. This signal is also applied to the Front Panel SCOPE SWEEP CONNECTOR.

4-19. The Servo Simulator System (not shown on block diagram) provides a sweep signal to radar indicators that normally require a sweep motor and resolver synchro signals from an antenna. It modulates an external reference voltage with position information that can be selected at fixed angles. The external reference voltage may also be modulated with position information that is swept between angles selected on the ANT ANGLE THUMBWHEELS. The Servo Simulator System develops outputs in either 3-phase synchro, 2-phase resolver, or linear azimuth pot formats.

DATE	REV	CHANGE	APP'D
2/9/77	A	CHG. DIRECTION OF INPUT ON 10 dB COUPLER IN X BAND FRONT END	

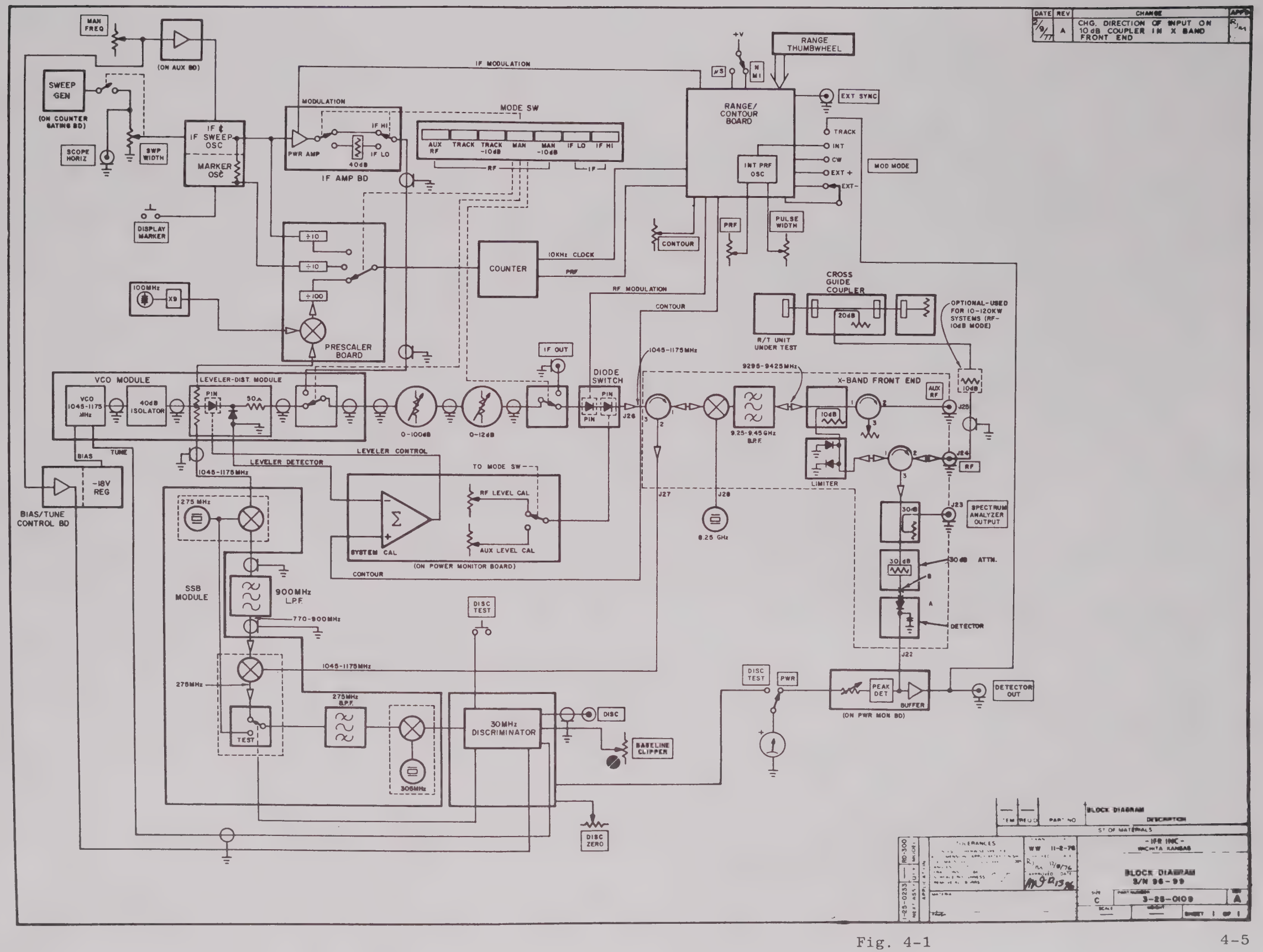
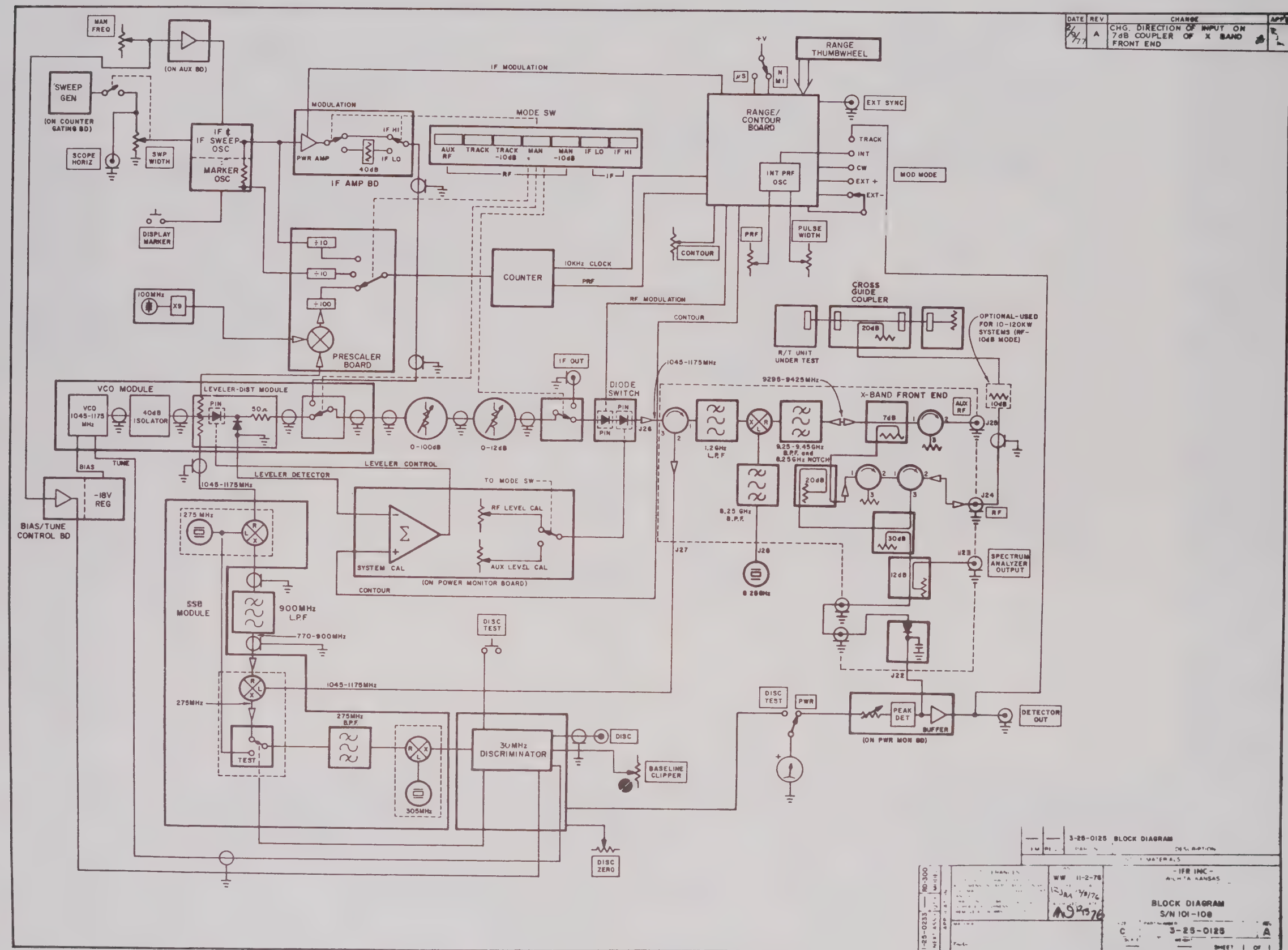


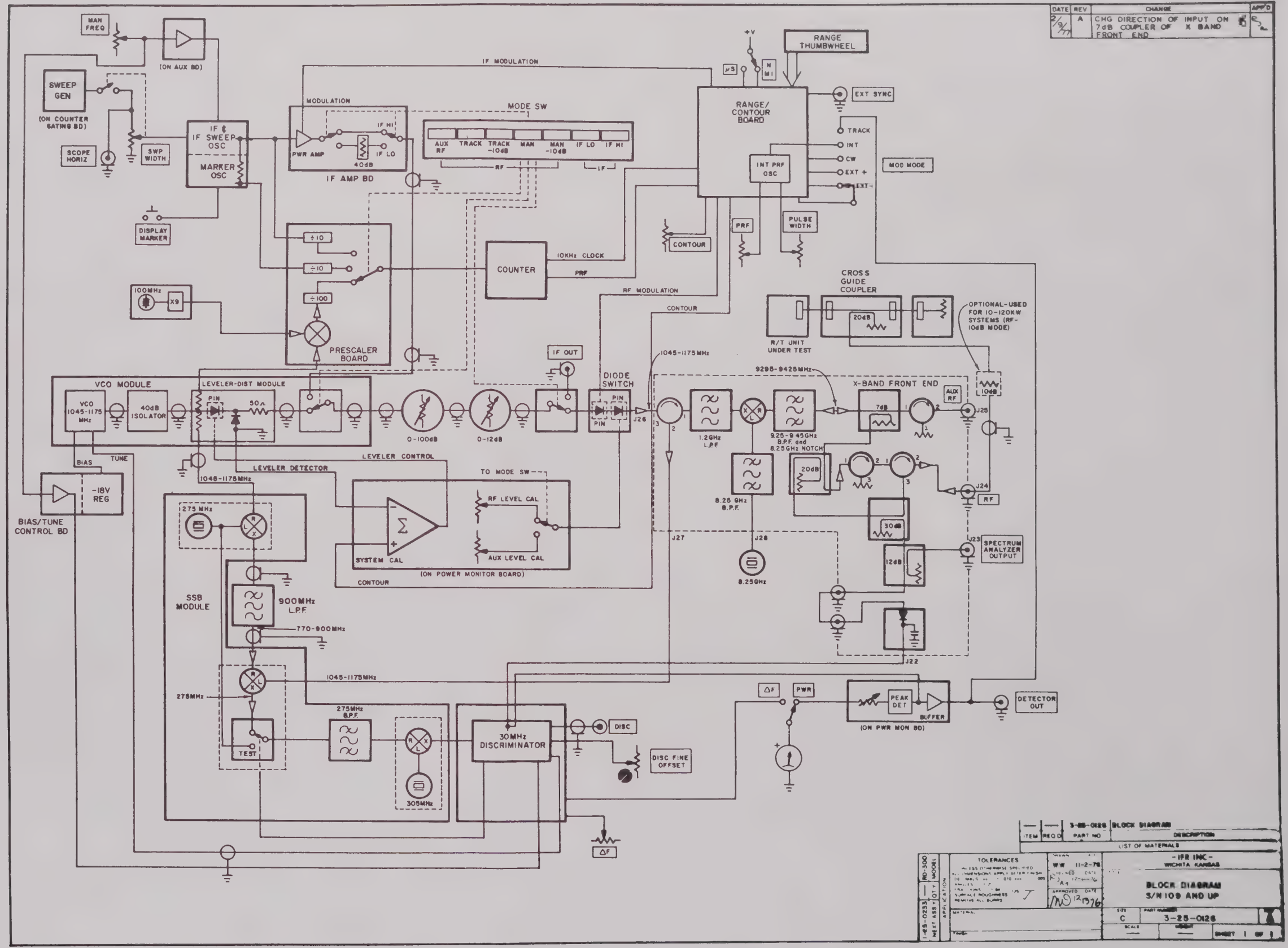
Fig. 4-1



DATE REV CHANGE APP'D
2/9/77 A CHG. DIRECTION OF INPUT ON 7dB COUPLER OF X BAND FRONT END
MAN FREQ
(ON AUX BD)
SWEEP GEN
(ON COUNTER GATING BD)
SCOPE HORIZ
SWP WIDTH
IF & IF SWEEP OSC
MARKER OSC
DISPLAY MARKER
IF MODULATION
MODULATION
PWR AMP
IF HI
IF LO
40dB
IF AMP BD
MODE SW
AUX RF
TRACK
TRACK -10dB
MAN
MAN -10dB
IF LO
IF HI
RF
IF
RANGE THUMBWHEEL
+V
μS
N MI
RANGE/ CONTOUR BOARD
INT PRF OSC
EXT SYNC
TRACK
INT
CW
EXT +
EXT-
MOD MODE
PRF
PULSE WIDTH
CONTOUR
÷10
÷10
÷100
PRESCALER BOARD
COUNTER
10KHz CLOCK
PRF
100MHz
X9
RF MODULATION
CONTOUR
CROSS GUIDE COUPLER
20dB
R/T UNIT UNDER TEST
OPTIONAL-USED FOR 10-120KW SYSTEMS (RF-10dB MODE)
10dB
IF OUT
1045-1175MHz
9296-9425MHz
X-BAND FRONT END
7dB
AUX RF
J25
VCO MODULE
VCO 1045-1175 MHz
40dB ISOLATOR
LEVELER-DIST MODULE
PIN
50Ω
0-100dB
0-12dB
DIODE SWITCH
PIN
J26
1.2GHz L.P.F
9.25-9.45GHz B.P.F. and 8.25GHz NOTCH
20dB
8.25 GHz B.P.F.
J24
RF
30dB
12dB
J23
SPECTRUM ANALYZER OUTPUT
J27
J28
8.25GHz
J22
BIAS
TUNE
-18V REG
BIAS/TUNE CONTROL BD
LEVELER CONTROL
LEVELER DETECTOR
1045-1175MHz
TO MODE SW
RF LEVEL CAL
AUX LEVEL CAL
SYSTEM CAL
(ON POWER MONITOR BOARD)
CONTOUR
275 MHz
SSB MODULE
900MHz L.P.F
770-900MHz
DISC TEST
1045-1175MHz
275MHz
TEST
275MHz B.P.F.
305MHz
30MHz DISCRIMINATOR
DISC
BASELINE CLIPPER
DISC ZERO
DISC TEST
PWR
PEAK DET
BUFFER
(ON PWR MON BD)
DETECTOR OUT
3-25-0125 BLOCK DIAGRAM
-IFR INC-
WICHITA KANSAS
BLOCK DIAGRAM
S/N 101-108
3-25-0125
SHEET 1 OF 1

Fig. 4-2

DATE	REV	CHANGE	APP'D
3/9/77	A	CHG DIRECTION OF INPUT ON 7dB COUPLER OF X BAND FRONT END	



ITEM	REQ'D	PART NO	DESCRIPTION
		3-28-0126	BLOCK DIAGRAM

LIST OF MATERIALS

MODEL	RO-300
NEXT ASSY	1-28-0233
APPLICATION	
TOLERANCES	
MATERIAL	
FINISH	
DRAWN	WW 11-2-76
APPROVED	DATE 12/13/76
- IFR INC - WICHITA KANSAS	
BLOCK DIAGRAM S/N 109 AND UP	
SIZE	C
PART NUMBER	3-28-0126
SCALE	
WEIGHT	
SHEET	1 OF 1

Fig. 4-3

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8049	Monolithic Antilog Amplifier.	7-7
DM8880	Decoder Driver	7-7
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SECTION V

PERFORMANCE EVALUATION

5-1. The Performance Evaluation Procedures are designed to verify the electrical performance of the RD-300. Each procedure is complete unto itself. If the Performance Evaluation Procedures give unsatisfactory results, and the circuit cannot be adjusted to operation within specifications, consult the Calibration Procedures, Section VI. If desired results are still not reached, contact IFR Customer Service.

5-2. Performance Evaluation Procedures should be run only by technicians thoroughly familiar with the Operating Procedures (Section III) and the Theory of Operation (Section IV) of the RD-300. IFR Precision Simulators are calibrated at the factory and should require only a periodic inspection and calibration. PLEASE DO NOT ATTEMPT ANY ADJUSTMENT EXCEPT AS SPECIFICALLY DETAILED IN THIS MANUAL. IFR Customer Service Personnel are available for consultation during regular business hours. Phone toll free: (800) 835-2350 (Customer Service Only) whenever you have questions or problems.

5-3. Equipment required for the Performance Evaluation Procedures is listed in Table 5-1. If no control settings are specified for the equipment, the operator should set the controls for the desired operation. Only those RD-300 controls which have a direct bearing on the particular procedure are called out. All control settings are for the RD-300 unless otherwise specified. Numbers in parentheses () following a control name identify its location in Figure 3-1. The Test Set should be powered up for a minimum of 15 minutes to stabilize before testing is begun.

5-4. A Performance Evaluation Data Record is included to facilitate the recording of the test results. Schematics and Parts Layouts are located in Section VIII and Mechanical Assemblies are in Section X.

Table 5-1

Recommended Equipment

Adaptors, Waveguide to Type N
Adaptor, Type N to Type SMA
Amplifier, Hewlett-Packard Model 461A, or equivalent
TWT Amplifier, Hewlett-Packard Model 495A, or equivalent
Attenuator, 10 dB

Table 5-1 (cont'd)

Attenuator, 20 dB Coaxial, Texscan FP-50-20 dB, or equivalent
Coaxial Cable, BNC to BNC
Coaxial Cables, lengths, types as needed for individual testing set-up
Coaxial Tee
Detector, Hewlett-Packard Model 423A, or equivalent
50 Ohm Load, Hewlett-Packard Model 10100C, or equivalent
Frequency Counter, Microwave, DANA Model 451, or equivalent
Frequency Counter, VHF 125 MHz, Fluke Model 1910A, or equivalent
Graph Paper
Oscilloscope, Tektronix Model 465, 100 MHz, or equivalent
Power Meter, General Microwave Model 460B Thermoelectric, with Model N422C 1 mW Power Head, Model N420C 10 mW Power Head and N421D 100 mW Power Head, or equivalent
Power Supply, +5 Volts dc
Power Supply, -12 Volts dc
Pulse Generator, Wavetek Model 183, or equivalent
Radar R/T Unit
Resistor, 100 K ohm, ½ W 10%
Signal Generator, L-Band Laboratory. Hewlett-Packard Model 8640B with Frequency Double Option 002, or equivalent
Signal Generator, X-Band. Hewlett-Packard Model 8620/86290A, or equivalent
Spectrum Analyzer, Hewlett-Packard Model 140T, with Model 8555A RF Section and Model 8552B IF Section, or equivalent.
Voltage Reference Source, 115 Volts and 26.4 Volts at 400 Hz
Voltmeter, Digital, Fluke Model 830, or equivalent
VSWR Bridge

5-5. MANUAL FREQUENCY RANGE TEST (All Units)

DESCRIPTION: The frequency range of the manual (MAN) RF mode is verified on the Digital Display (12).

SPECIFICATION: Nominal 9295 to 9425 MHz.

PROCEDURE:

1. Set controls as follows:

   RF/IF Mode (25) . . . . . RF MAN

   PRF/RF (11) . . . . . RF

2. Adjust MAN FREQ Controls (10) to full ccw. Digital Display (12) should read 9295 MHz maximum.

   _____ 9295 MHz

3. Adjust MAN FREQ Control (10) to full cw. Digital Display (12) should read 9425 MHz minimum.

   9425 MHz _____

5-6. RF OUTPUT FREQUENCY SENSITIVITY TEST (All Units)

DESCRIPTION: The RF output power level is plotted as a function of frequency to measure the sensitivity of the RF output to variations in frequency. The RF output level is calibrated at the R/T unit using the Serialized Coaxial Cable.

SPECIFICATION: ±2 dB over a frequency range of 9295 MHz to 9425 MHz.

EQUIPMENT: Power Meter (Table 5-1)

PROCEDURE:

1. Set controls as follows:

   RF/IF Mode (25). . . . . RF MAN

   MODULATION Mode (42) . . . . . CW

   OUTPUT (18). . . . . -50 dBm

   CONTOUR (14) . . . . . 0 dB

   PRF/RF . . . . . RF

5-6. RF OUTPUT FREQUENCY SENSITIVITY TEST (All Units) (con't)

2. Connect one end of Serialized Coaxial Cable to RF Output Connector (31) and other end to Power Meter.

3. Using MAN FREQ Controls (10), vary frequency and record Power Meter readings to plot a graph (Figure 5-1) of Power Meter readings versus frequency. Power Meter should read -30 (±2) dBm. Care should be taken to plot all peaks and valleys in the signal level.

NOTE

Since the -20 dB Waveguide Directional Coupler is not used, there will be a 20 dB difference between the attenuator settings and the actual power measurement.

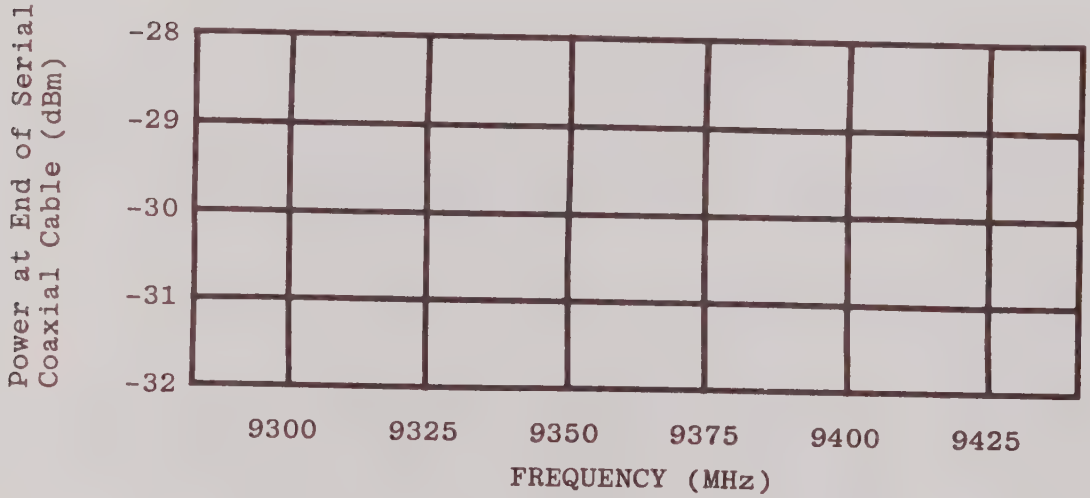


Figure 5-1. RF Output Frequency Sensitivity Graph

4. Note frequency at which Power Meter indicates exactly -30 dBm.

_____ MHz

5-7. AUX OUTPUT FREQUENCY SENSITIVITY TEST (All Units)

DESCRIPTION: The auxiliary output power is plotted as a function of frequency to measure the sensitivity of the auxiliary output to variations in frequency.

5-7. AUX OUTPUT FREQUENCY SENSITIVITY TEST (All Units) (con't)

SPECIFICATION: ±3 dB over a frequency range of 9295 to 9425 MHz.

EQUIPMENT: Power Meter (Table 5-1)

PROCEDURE:

1. Set controls as follows:

RF/IF Mode (25)	RF AUX
MODULATION Mode (42)	CW
OUTPUT (18)	-30 dBm
CONTOUR (14)	0 dB
PRF/RF (11)	RF

2. Connect Power Meter directly to AUX OUT Connector (22).

3. Using MAN FREQ Controls (10), vary frequency and record Power Meter readings to plot a graph (Figure 5-2) of Power Meter readings versus frequency. Power Meter should read -30 (±3) dBm. Care should be taken to plot all peaks and valleys in the signal level.

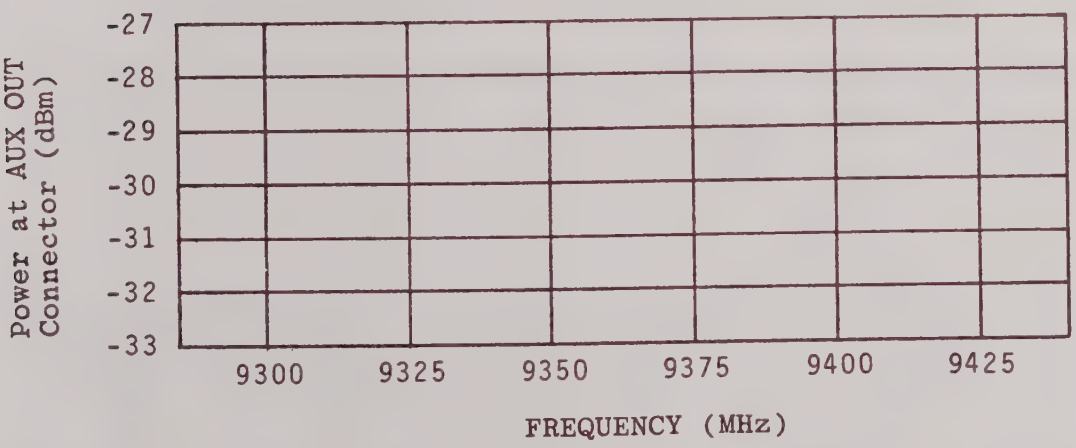


Figure 5-2. AUX OUT Connector Frequency Sensitivity Graph.

4. Note frequency at which Power Meter indicates exactly -30 dBm.

_____ MHz

5-8. RF OUTPUT ATTENUATION ACCURACY TEST (All Units)

DESCRIPTION: The accuracy of the OUTPUT dB and OUTPUT dBm Controls (13 and 18) and CONTOUR dB Control (14) is checked by stepping through the attenuator settings and measuring the actual output power with an X-Band Spectrum Analyzer.

SPECIFICATION: -50 to -120 dBm, ±2 dB

EQUIPMENT: Spectrum Analyzer (Table 5-1)

PROCEDURE:

1. Set controls as follows:

   RF/IF Mode (25). . . . . RF MAN

   MODULATION Mode (42) . . . . . CW

   PRF/RF (11). . . . . RF

   CONTOUR (14) . . . . . 0 dB

2. Connect Spectrum Analyzer to RF Output Connector (31) using Serialized Coaxial Cable.

3. Adjust MAN FREQ Controls (10), for frequency recorded in Step 4 of Paragraph 5-6.

   Frequency _____ MHz

4. Set Spectrum Analyzer controls as follows:

   Sensitivity. . . . . 2 dB/cm

   Bandwidth. . . . . 30 kHz

   Span . . . . . 50 kHz/div

5. Set OUTPUT dBm Control (18) to -50 and switch through the settings on the OUTPUT dB Control (13). Record output power as indicated in Spectrum Analyzer. Actual readings should lie in 1 dB increments (±0.5 dB).

NOTE

Since the -20 dB Waveguide Directional Coupler is not used, there will be a 20 dB difference between the attenuator settings and the actual power measured.

5-8. RF OUTPUT ATTENUATION ACCURACY TEST (con't)

OUTPUT dBm CONTROL SETTINGS	RF OUTPUT POWER (AT END OF SERIALIZED COAXIAL CABLE)(dBm)		
	MIN	ACTUAL	MAX
-50		-30	
-51	-31.5	_____	-30.5
-52	-32.5	_____	-31.5
-53	-33.5	_____	-32.5
-54	-34.5	_____	-33.5
-55	-35.5	_____	-34.5
-56	-36.5	_____	-35.5
-57	-37.5	_____	-36.5
-58	-38.5	_____	-37.5
-59	-39.5	_____	-38.5
-60	-40.5	_____	-39.5
-61	-41.5	_____	-40.5
-62	-42.5	_____	-41.5

6. Adjust CONTOUR dB Control (14) as noted and switch through settings on OUTPUT dBm Control (18). Record output power as indicated on Spectrum Analyzer. Spectrum Analyzer sensitivity should be set to 10 dB/div. Actual readings should be in 10 dB increments (±1.0 dB).

CONTOUR dB CONTROL SETTINGS	OUTPUT dBm CONTROL SETTINGS	RF OUTPUT POWER (AT END OF SERIALIZED COAXIAL CABLE) (dBm)		
		MIN	ACTUAL	MAX
+10	-50	-21	_____	-19
+10	-60	-31	_____	-29
+20	-70	-31	_____	-29
+20	-80	-41	_____	-39
+20	-90	-51	_____	-49
+20	-100	-61	_____	-59
+20	-110	-71	_____	-69
+20	-120	-81	_____	-79

5-9. SPECTRUM ANALYZER OUTPUT ATTENUATION TEST (All Units)

DESCRIPTION: An X-Band Signal Generator is used as a reference power source to test for proper attenuation between the RF Output Connector (31) and the Spectrum Analyzer Connector (48) on Back Panel.

5-9. SPECTRUM ANALYZER OUTPUT ATTENUATION TEST (con't)

SPECIFICATION: 42 (±6) dB below power level at RF input,
62 (±6) dB below power level at RF input
for units with additional 20 dB attenuation
installed.

EQUIPMENT: Spectrum Analyzer (Table 5-1)

PROCEDURE:

1. Set Controls as follows:

RF/IF MODE (25)	RF MAN
MODULATION MODE (42)	EXT
OUTPUT (18)	Minimum setting
CONTOUR (14)	0 dB

2. Connect Coaxial Cable to output connector of X-Band Generator and use Spectrum Analyzer to measure RF power at free end of cable for use as a reference input for RF Output Connector (31). Set generator output level to 0 dBm or max. output if 0 dBm unavailable. Record power level.

Power Level _____ dBm

3. Connect free end of cable to RF Output Connector (31) and connect Spectrum Analyzer to Spectrum Analyzer Connector (48) using a test cable of known insertion loss.

4. Measure power level at Spectrum Analyzer Connector (48) with the Spectrum Analyzer. Record power level.

Power Level _____ dBm

5. Calculate attenuation according to the following formula:

ATTENUATION = (REFERENCE POWER LEVEL) MINUS (SPECTRUM ANALYZER CONNECTOR POWER LEVEL) PLUS (TEST CABLE LOSS)

Example: Reference Power Level (Step 2) = -8 dBm
Spectrum Analyzer Connector Power Level (Step 4) = -54 dBm
Test Cable Loss = -3 dB

5-9. SPECTRUM ANALYZER OUTPUT ATTENUATION TEST (con't)

ATTENUATION (dB) = (-8) - (-54) + (-3) = 43

Calculated Attenuation Value:	36 dB or 56 dB	_____	48 dB or 68 dB

5-10. RF ON/OFF RATIO TEST (All Units)

DESCRIPTION: A Spectrum Analyzer is used to determine the difference between the power levels of the ON and OFF states of the RF power output.

SPECIFICATION: Power Level of OFF state should be more than 38 dB (65 dB for units with improved Main Diode Switch installed) below that of ON state.

EQUIPMENT: Spectrum Analyzer (Table 5-1)

PROCEDURE:

1. Set controls as follows:

RF/IF Mode (25)	RF AUX
MODULATION Mode (42)	CW
OUTPUT (18)	-20 dBm
PRF/RF (11)	RF
MAN FREQ (10)	9375 MHz
CONTOUR (14)	0 dB
[Units prior to S/N 109	20 dB]

2. Connect Spectrum Analyzer to AUX OUT Connector (22).

3. Measure Test Set Power Level with Spectrum Analyzer.

ON Level _____ dBm

4. Select EXT (+) MODULATION Mode. Do not apply an external trigger.

5. Measure Test Set Power Level with Spectrum Analyzer.

OFF Level _____ dBm

6. The RF ON/OFF ratio is the difference between the ON Level and OFF Level. The OFF level should be more than 38 dB (or 65 dB) below the ON level.

ON/OFF Ratio (>38 dB or >65 dB) _____

[1] In sets S/N 96 through S/N 99, calculated attenuation should lie between 60 and 66 dB.

5-11. TRACK MODE ACCURACY TEST (Units Prior to S/N 109)

DESCRIPTION: A Spectrum Analyzer is used to monitor the pulse spectrum of the R/T unit the CW spectrum of the Test Set, and the difference between the centers of the two spectrum displays.

SPECIFICATION: Track magnetron frequency within ±25 kHz. (Magnetron pulse width greater than 2 µs)

EQUIPMENT: Spectrum Analyzer, Radar R/T Unit (Table 5-1)

PROCEDURE:

1. Set controls as follows:

   RF/IF Mode (25) . . . . . RF TRACK

   MODULATION Mode (42) . . . . . CW

   PWR/DISC . . . . . DISC

2. Connect Spectrum Analyzer to AUX OUT Connector (22).

3. Connect Radar R/T Unit to Test Set and, if Radar R/T Unit has variable pulse width, select widest pulse width.

4. When TRACK Indicator (28) comes on, note reading on DISC scale of Test Set Panel Meter (54). Press TEST Switch, and adjust ZERO Control until Panel Meter (54) corresponds to previously noted reading.

5. Adjust center frequency on Spectrum Analyzer to center main lobe of pulse spectrum.

6. Set controls on Spectrum Analyzer as follows:

   Bandwidth . . . . . 30 kHz

   Span . . . . . 100 kHz/div

7. Set OUTPUT dBm Control (18) so that CW spectrum amplitude is approximately 10 dB below pulse spectrum amplitude.

8. Measure tracking error as shown in Figure 5-3 and record characteristics of Radar R/T Unit. Tracking error should not exceed 25 kHz with a Magnetron pulse greater than 2 µs.

5-11. TRACK MODE ACCURACY TEST (cont'd)

Radar R/T Unit	Pulse WIDTH (µs)	PRF (Hz)	TRACKING ERROR	
			Actual	Max
_____	_____	_____	_____	25 kHz
_____	_____	_____	_____	25 kHz
_____	_____	_____	_____	25 kHz
_____	_____	_____	_____	25 kHz

5-11A. TRACK MODE ACCURACY TEST (Using a Radar R/T Unit) (Units S/N 109 on)

NOTE

For the Radar R/T Units with moderate to severe FM during the transmitter pulse (5 mV or greater ripple in the middle of the pulse at the DISC OUT Connector (20), see Fig. 3-6). The RD-300 may not track the middle of the spectrum to the below tolerances. If the Radar R/T Unit exhibits FM, or extreme precision is required for this measurement, use the procedure in Paragraph 5-11B.

DESCRIPTION: A Spectrum Analyzer is used to monitor the pulse spectrum of the Radar R/T Unit, the CW Spectrum of the Test Set, and the difference between the centers of the two spectrum displays.

SPECIFICATION: Track magnetron frequency within ±25 kHz for pulse widths greater than 2 µs and within ±100 kHz for pulse widths less than 2 µs.

EQUIPMENT: Spectrum Analyzer, Radar R/T Unit (Table 5-1)

PROCEDURE:

1. Set controls as follows:

RF/IF Mode (25) . . . . . RF TRACK

MODULATION Mode (42). . . . . CW

ΔF (6). . . . . Cal (detent)

5-11A. TRACK MODE ACCURACY TEST (cont'd)

2. Connect Spectrum Analyzer to AUX OUT Connector (22).

3. Connect Radar R/T Unit to Test Set.

4. Adjust center frequency on Spectrum Analyzer to center main lobe of pulse spectrum.

5. Set controls on spectrum analyzer as follows:

Bandwidth	30 kHz
Span.	100 kHz/div. (PW > 2 µs) 500 kHz/div. (PW < 2 µs)
RF Attenuation	10 dB

6. Set OUTPUT dBm Control (18) so that CW spectrum amplitude is approximately 10 dB below pulse spectrum amplitude.

7. Measure tracking error as shown in Figure 5-3 and record characteristics of Radar R/T Unit. Tracking error should not exceed 25 kHz for pulse widths greater than 2 µs or 100 kHz for pulse widths less than 2 µs. Perform test for various available pulse widths.

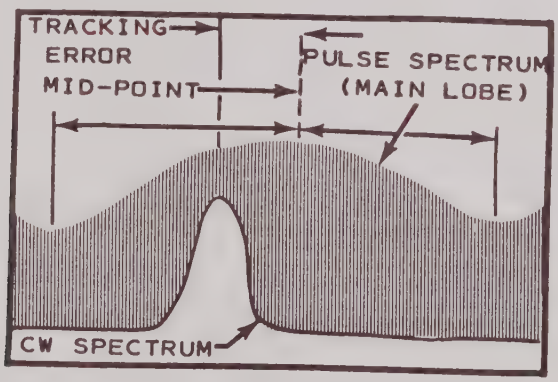


Figure 5-3. Spectrum Analyzer Display of Tracking Error

5-11A. TRACK MODE ACCURACY TEST (cont'd)

Radar R/T Unit	Pulse WIDTH (µs)	PRF (Hz)	TRACKING ERROR	
			Actual	Max
				25 kHz
				25 kHz
				25 kHz
				25 kHz

5-11B. TRACK MODE ACCURACY (Using a L-Band Signal Generator) (Units S/N 109 on)

DESCRIPTION: A Spectrum Analyzer is used to monitor the pulse spectrum of the Signal Generator (used to simulate a Radar R/T Unit signal) and the CW Spectrum of the Test Set. A measurement is then made of the difference between the center of the two spectrum displays.

SPECIFICATION: Track magnetron frequency within ±25 kHz for pulse widths greater than 2 µs and within ±100 kHz for pulse width less than 2 µs.

EQUIPMENT: Spectrum Analyzer, L-Band Signal Generator, Pulse Generator, 20 dB Coaxial Attenuator (Table 5-1).

PROCEDURE:

1. Set controls as follows:

RF/IF Mode (25)	RF TRACK
MODULATION (42)	CW
CONTOUR (14)	OFF
ΔF (6)	Cal (detent)
OUTPUT (18)	-100 dBm

2. Set the L-Band Signal Generator controls as follows:

FREQUENCY	1095.00 MHz (phase locked)
OUTPUT LEVEL	-5 dBm
MODULATION MODE	PULSE

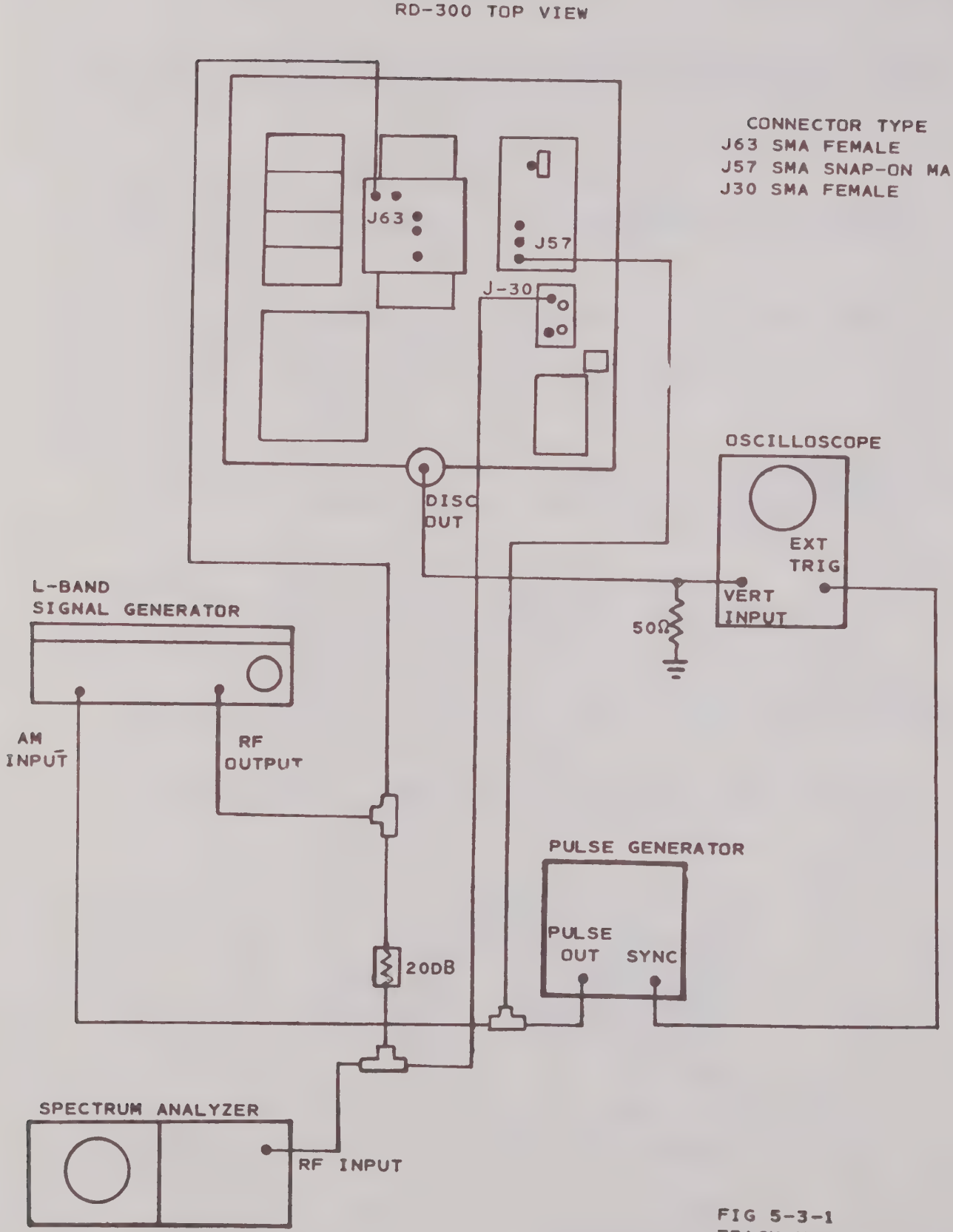


FIG 5-3-1
TRACK MODE
ACCURACY TEST SET-UP

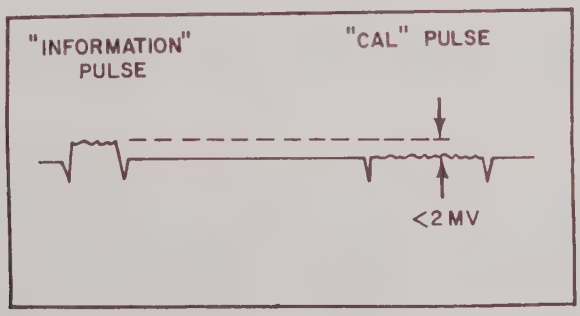
5-11B. TRACK MODE ACCURACY (Using a L-Band Signal Generator) (cont'd)

3. Set the Pulse Generator controls as follows:

PULSE REPETITION FREQUENCY	500 Hz
PULSE WIDTH	5 µs
PULSE AMPLITUDE	2 Volts peak to peak, -1 Volt baseline (into 50 Ω input impedance of AM INPUT of Signal Generator)

4. Connect the equipment as in Fig. 5-3-1. The internal connections to the Test Set will require removing the top cover. Also remove the front two screws on the large Servo Simulator Board and swing it back out of the way on its hinges.

5. Set the scope controls as follows: 10 mV/div, 10 µs/div, EXT trigger. Verify that the mid point of the 5 µs "information" pulse at time zero matches within 2 mV the 40 µs "calibration" pulse at time 40 µs. Slightly adjust the Discriminator Fine Zero Control if necessary (screw driven adjustment located above the DISC OUT Connector (20).



6. Tune the Spectrum Analyzer to 1095 MHz and center the main lobe of the pulse spectrum in the display. Set the Analyzer Controls as follows: Bandwidth 30 kHz, Scan Width 100 kHz/div, Log Reference Level -50 dBm, RF Attenuation 10 dB, Log Display 10 dB/div.

7. Measure tracking error as shown in Fig. 5-3.

5-12A. ΔF CONTROL TEST (Using a Radar R/T Unit). (Units S/N 109 on)

DESCRIPTION: The Test Set Digital Display (12) is used to verify the frequency offset of the ΔF Control (6).

SPECIFICATION: Signal Generator frequency may be offset ±0.75 MHz (±10%) from the Magnetron Frequency.

EQUIPMENT: Radar R/T Unit (Table 5-1)

PROCEDURE:

1. Set controls as follows:

   RF/IF Mode (25). . . . . RF TRACK

   MODULATION Mode (42) . . . . . TRACK

   PWR/ΔF (7) . . . . . ΔF

   ΔF (6) . . . . . Cal (detent)

   PRF/RF (11). . . . . RF

2. Connect Test Set to Radar R/T Unit and allow Radar R/T Unit to stabilize for 15 minutes.

3. Adjust ΔF Control (6) for Panel Meter (8) reading of 0. Note that UNCAL Indicator (5) lights. Record Digital Display (12) indication as Reference Frequency.

   Reference _____ MHz

4. Adjust ΔF Control (6) for a Panel Meter (8) reading of +0.5 MHz. Note that frequency on Digital Display (12) is between 0.47 and 0.53 MHz above Reference Frequency.

   Above Reference 0.47 MHz _____ 0.53 MHz

5. Adjust ΔF Control (5) for a Panel Meter (8) indication of -0.5 MHz. Note that frequency on Digital Display (12) is between 0.47 and 0.53 MHz below Reference Frequency.

   0.53 MHz _____ 0.47 MHz Below Reference

5-12A. ΔF CONTROL TEST (Using a Radar R/T Unit) (cont'd)

6. Set ΔF CONTROL (6) to 0 position, and verify that Magnetron/Reference Frequency has not drifted more than 20 kHz during test.

_____(✓)

5-12B. ΔF CONTROL TEST (Using L-Band Signal Generator) (Units S/N 109 on)

DESCRIPTION: The Test Set Digital Display (12) is used to verify the frequency offset of the ΔF Control (6). A Laboratory Signal Generator is used to simulate a radar signal.

SPECIFICATION: Signal Generator frequency may be offset ±0.75 MHz (±10%) from the Magnetron Frequency.

EQUIPMENT: L-Band Signal Generator, Pulse Generator (Table 5-1)

PROCEDURE:

1. Set Test Set controls as follows

RF/IF MODE (25)	RF TRACK
MODULATION MODE (42)	TRACK
PWR/ΔF (7)	ΔF
ΔF (6)	CAL (detent)
PRF/RF (11)	RF

2. Connect the equipment as per Fig. 5-3-2. The internal connections to the Test Set will require removing the top cover. Also remove the front two screws on the large Servo Simulator Board, and swing it back out of the way on its hinges.

3. Set the L-Band Signal Generator controls as follows:

FREQUENCY	1095.00 MHz (Phase Locked)
OUTPUT LEVEL	-5 dBm
MODULATION Mode	PULSE

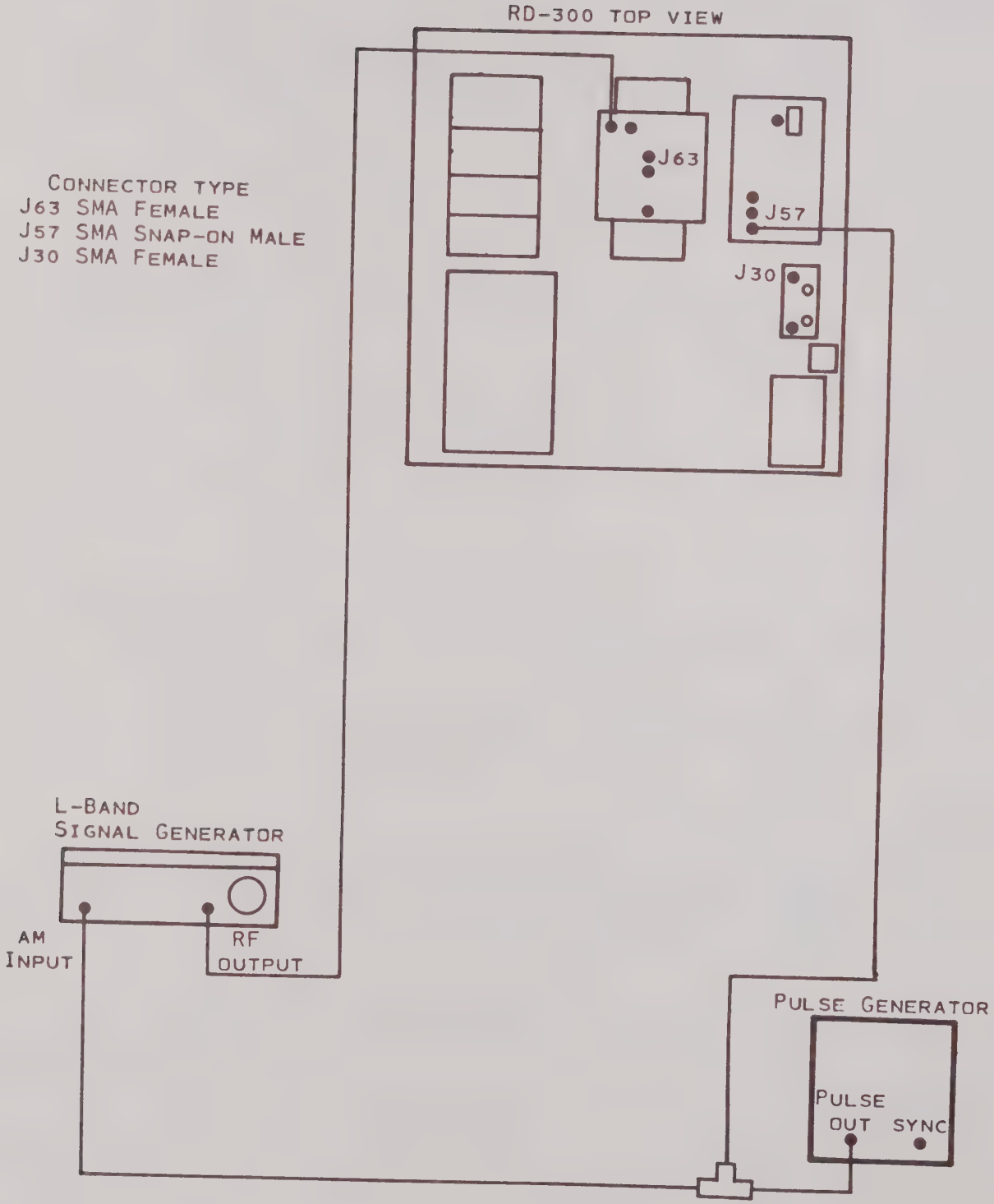


FIGURE 5-3-2 ΔF CONTROL TEST SETUP

5-12B. ΔF CONTROL TEST (cont'd)

4. Set the Pulse Generator controls as follows:

PULSE REPETITION RATE. . . . . .500 Hz

PULSE WIDTH. . . . . .5 μs

PULSE AMPLITUDE. . . . . .2 Volts peak to peak, -1 Volt baseline (into 50 Ω input impedance of AM input of Signal Generator)

5. Note RF Frequency on Digital Display (12) for use as a Reference Frequency.

Reference _____ MHz

6. Adjust ΔF Control (6) for a Panel Meter (8) reading of +0.5 MHz. Note that the frequency on the Digital Display (12) is between 0.47 and 0.53 MHz above Reference Frequency.

Above Reference 0.47 MHz _____ 0.53 MHz

7. Adjust ΔF Control (6) for a Panel Meter (8) reading of -0.5 MHz. Note that the frequency on the Digital Display (12) is between 0.47 and 0.53 MHz below the Reference Frequency.

0.53 MHz _____ 0.47 MHz Below Reference

5-13. DISCRIMINATOR OUTPUT CALIBRATION FACTOR TEST (Units prior to S/N 109)

DESCRIPTION: The calibration factor of the DISC OUT Connector (20) is tested by offsetting the Test Set frequency and measuring the amplitude shift of the discriminator signal.

SPECIFICATIONS: 0.1 (±0.01) Volts/MHz into 50 Ohm Load.

EQUIPMENT: Oscilloscope, Radar R/T Unit, 50 Ohm Load (Table 5-1)

5-13. DISCRIMINATOR OUTPUT CALIBRATION FACTOR TEST (cont'd)

PROCEDURE:

1. Set controls as follows:

   RF/IF Mode (25). . . . . RF TRACK

   MODULATION MODE (42) . . . . . TRACK

   PRF/RF (11). . . . . RF

   PWR/DISC . . . . . DISC

2. Connect Test Set to Radar R/T Unit and allow Radar R/T Unit to stabilize.

3. Connect DISC OUT Connector (20) to scope and terminate in 50 Ohm Load. Trigger scope from DET Connector (24). Set scope controls as follows:

   Vertical Sensitivity. . . . . 0.1 V/div

   Sweep Rate. . . . . 1 µs/div

4. When TRACK Indicator (28) comes on, note reading on DISC scale of Test Set Panel Meter (54). Press TEST Switch, and adjust ZERO Control until Panel Meter (54) corresponds to previously noted reading.

5. Note Digital Display (12) reading and adjust ZERO Control until frequency increases by 0.5 MHz.

   _____ MHz

6. Note amplitude of displayed pulse for 0.5 MHz offset as shown in Figure 5-4.

   0.5 MHz offset _____ Volts

7. Note reading on DISC scale of Test Set Panel Meter (54). Press TEST Switch, and adjust ZERO Control until Panel Meter (54) corresponds to previously noted reading.

   _____ (✓)

8. Note Digital Display (12) reading and adjust ZERO Control until frequency decreases by 0.5 MHz.

   _____ MHz

5-13. DISCRIMINATOR OUTPUT CALIBRATION FACTOR TEST (cont'd)

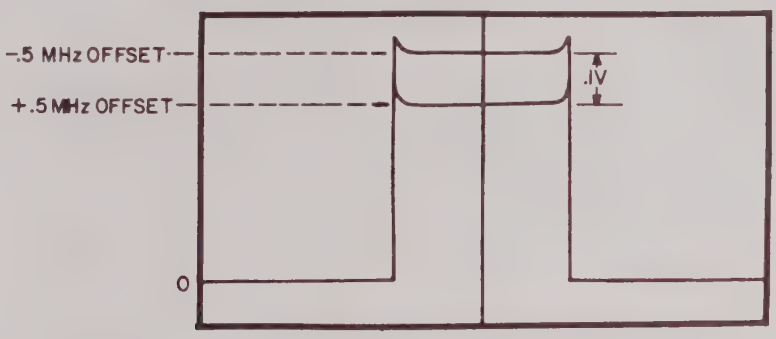


Figure 5-4. Discriminator Output Calibration Factor Oscilloscope Display.

9. Note amplitude of displayed pulse for -0.5 MHz offset as shown in Figure 5-4.

-0.5 MHz offset _____ Volts

10. Note that amplitude measured in Step 7 is 0.1 Volts (±0.01 Volts) above amplitude measured in Step 5 (subtract +0.5 MHz offset amplitude from -0.5 MHz offset amplitude).

1 MHz = 0.09 Volts _____0.11 Volts

5-13A. DISCRIMINATOR OUTPUT CALIBRATION FACTOR TEST (Using Radar R/T Unit) (Units S/N 109 on)

DESCRIPTION: The calibration factor of the DISC OUT Connector (20) is tested by offsetting the Test Set frequency and measuring the amplitude shift of the Discriminator Signal.

SPECIFICATIONS: 0.1 (±0.02) Volts/MHz into 50 Ohm Load.

EQUIPMENT: Oscilloscope, Radar R/T Unit, 50 Ohm Load (Table 5-1)

PROCEDURE:

1. Set controls as follows:

RF/IF Mode (25). . . . . RF TRACK

MODULATION MODE (42) . . . . . TRACK

PRF/RF (11). . . . . RF

PWR/ΔF (7) . . . . . ΔF

ΔF (6). . . . . CAL (detent)

5-13A. DISCRIMINATOR OUTPUT CALIBRATION FACTOR TEST (cont'd)

2. Connect Test Set to Radar R/T Unit and allow R/T to stabilize.

3. Connect DISC OUT Connector (20) to scope and terminate in 50 Ohm Load. Trigger scope from DET Connector (24). Set scope controls as follows:

   Vertical Sensitivity. . . . . 0.1 V/div

   Sweep Rate. . . . . 1 µs/div

4. Note Digital Display (12) reading (Reference Frequency). Adjust ΔF Control (6) for Reference Frequency plus 0.5 MHz.

   Reference Frequency _____ MHz

5. Note amplitude of display pulse for ΔF = +0.5 MHz as shown in Figure 5-4-1.

   ΔF = +0.5 MHz _____ Volts

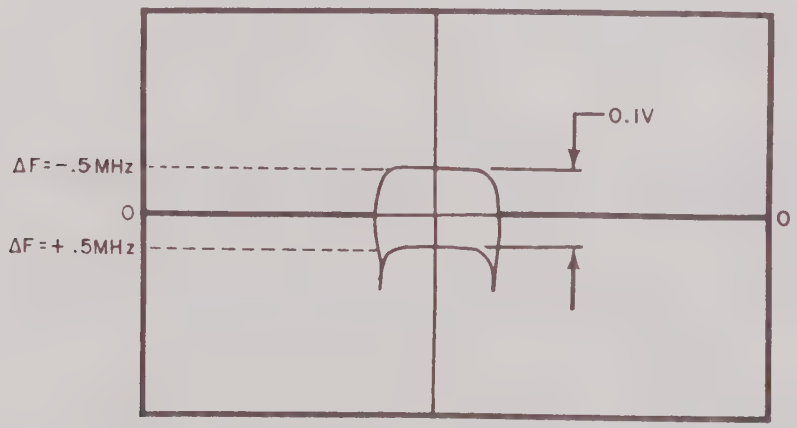


Figure 5-4-1. Discriminator Output Calibration Factor Oscilloscope Display.

6. Adjust ΔF Control (6) for a Digital Display (12) reading of Reference Frequency minus 0.5 MHz.

7. Note amplitude of display pulse for ΔF = -0.5 MHz as shown in Figure 5-4-1.

   ΔF = -0.5 MHz _____ Volts

8. Note that amplitude measured in Step 5 is 0.1 Volt (±0.01 Volt) below amplitude measured in Step 7 (subtract ΔF = +0.5 amplitude from ΔF = -0.5 amplitude).

   0.08 Volts _____ 0.12 Volts

5-13B. DISCRIMINATOR OUTPUT CALIBRATION FACTOR TEST (Using a L-Band Signal Generator) (Units S/N 109 on)

DESCRIPTION: The calibration factor of the DISC OUT Connector (20) is tested by offsetting the Test Set frequency and measuring the amplitude shift of the Discriminator Signal.

SPECIFICATIONS: 0.1 (±0.02) Volts/MHz into 50 Ohm Load.

EQUIPMENT: L-Band Signal Generator, Oscilloscope, 50 Ohm Load (Table 5-1)

PROCEDURE:

1. Set test set controls as follows:

   RF/IF MODE (25). . . . . RF TRACK

   MODULATION (42). . . . . TRACK

   PRF/RF (11). . . . . RF

   PWR/ΔF (7) . . . . . ΔF

   ΔF (6) . . . . . CAL (detent)

2. Connect the equipment as in Fig. 5-3-2. The internal connections to the Test Set will require removing the top cover. Also remove the front two screws on the large Servo Simulator Board, and swing it back out of the way on its hinges.

3. Connect DISC OUT Connector (20) to scope and terminate in 50 Ohm Load. Trigger scope from DET Connector (24). Set scope controls as follows:

   Vertical Sensitivity. . . . . 0.1 V/div.

   Sweep Rate. . . . . 1 μs/div.

4. Note Digital Display (12) reading (Reference Frequency). Adjust ΔF Control (6) for Reference Frequency plus 0.5 MHz.

   Reference Frequency _____ MHz

5. Note amplitude of displayed pulse for ΔF = +0.5 MHz as shown in Figure 5-4-1.

   ΔF = + 0.5 MHz _____ Volts

5-13B. DISCRIMINATOR OUTPUT CALIBRATION FACTOR TEST (Using a L-Band Signal Generator) (cont'd)

6. Adjust ΔF Control (6) for a Digital Display (12) reading of Reference Frequency minus 0.5 MHz.

7. Note amplitude of displayed pulse for ΔF = -0.5 MHz as shown in Figure 5-4-1.

ΔF = -0.5 MHz _____ Volts

8. Note that amplitude measured in Step 5 is 0.1 Volt (±0.02 Volt) below amplitude measured in Step 7 (subtract ΔF = + 0.5 amplitude from ΔF = -0.5 amplitude).

0.08 Volts _____ 0.12 Volts

5-14. DETECTOR OUTPUT LINEARITY TEST (All Units) (Using X-Band Signal Generator and TWT Amplifier)

DESCRIPTION: An X-Band Signal Generator and a TWT Amplifier are used to produce a variable input to the Test Set Detector Diode in order to test the linearity of the power output of the Detector Diode. The Test Set Panel Meter (8) and an Oscilloscope monitor the Detector Diode output through an internal Test Set connector (A) and the DET Connector (24).

SPECIFICATION: The output readings should lie in a straight line (±10%) when plotted on Semilog Graph Paper, with the Oscilloscope reading (Volts) Linear and the Panel Meter (8) (power) Log.

EQUIPMENT: X-Band Signal Generator, TWT Amplifier, Type N to Type SMA Adaptor, Oscilloscope, Semilog Graph Paper, 50 Ohm Load, Coaxial Tee, BNC to BNC Coaxial Cable, and Coaxial Cable appropriate to link X-Band Signal Generator to TWT Amplifier (Table 5-1)

PROCEDURE:

1. Press the LINE Switch (41) OFF. Connect the X-Band Signal Generator output connector to the TWT Amplifier input connector with a coaxial cable to appropriate length and type. Connect the TWT Amplifier output connector to the RD-300 X-Band Front End Connector A (See Figure 5-5 and Figure 8-38) with the Type N to Type SMA Adaptor. Using a BNC to BNC Coaxial Cable and the Coaxial Tee, link the DET Connector (24) of the RD-300 with the input connector of the Oscilloscope and terminate it with the 50 Ohm Load.

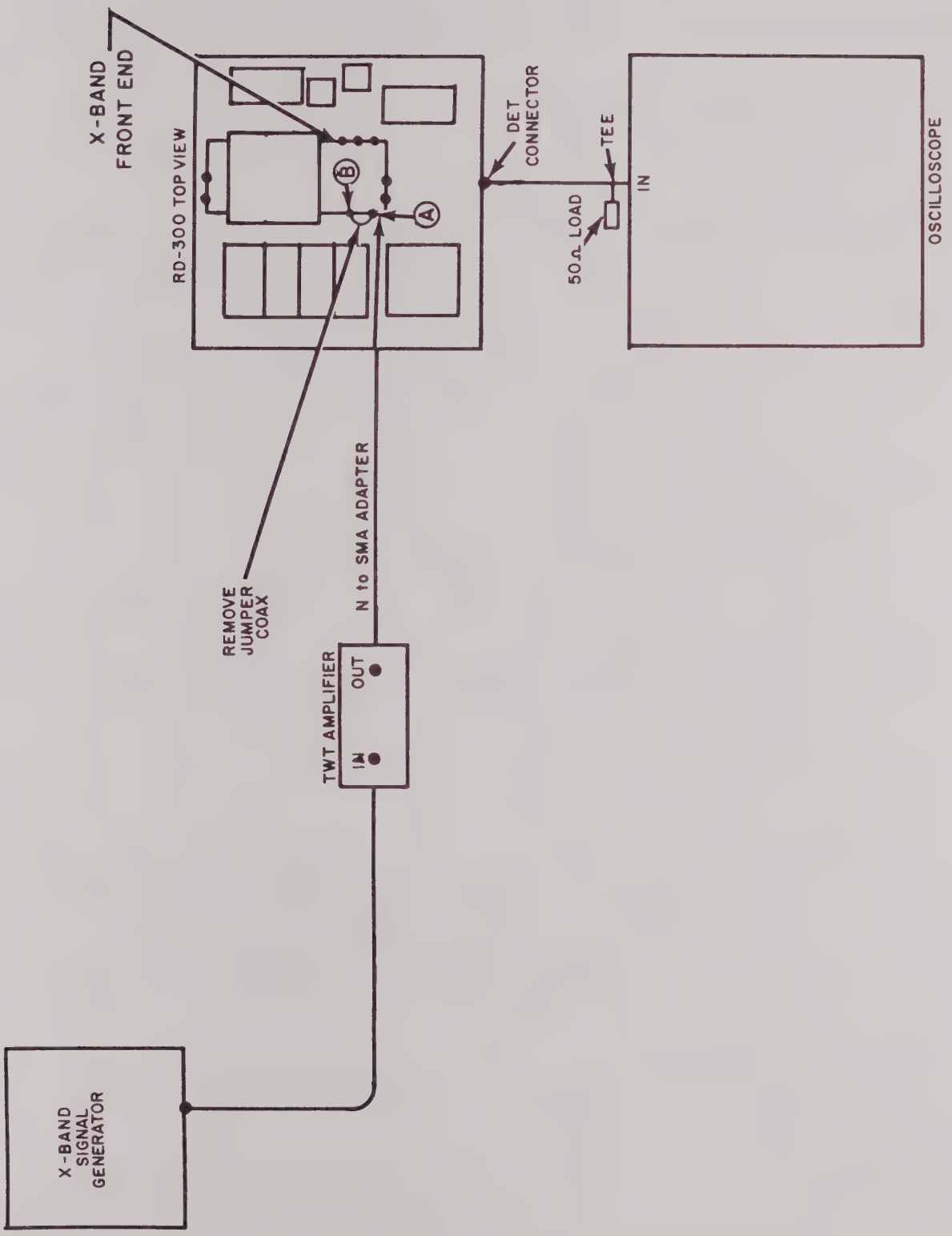


FIG. 5-5 DETECTOR OUTPUT LINEARITY TEST SETUP

5-14. DETECTOR OUTPUT LINEARITY TEST (cont'd)

NOTE:

In sets S/N 96 through S/N 99, the X-Band Front End consists of discrete components which are delineated in Figure 4-1. In this Assembly, connectors A and B are the coaxial connectors that lie between the 30 dB Attenuator and the Detector. Disconnect the Diode, and connect the X-Band Signal Generator through the Type N to Type SMA Adaptor to Connector A. Then connect the RD-300 to the Oscillator as per above and follow the other instructions as usual.

2. Reduce the X-Band Signal Generator output to -40 dBm or below.

3. Set the X-Band Signal Generator controls to produce a 3 μs pulse at a frequency of 9375 MHz.

4. Set the PWR/ΔF Control (7) on the RD-300 to PWR, and press the LINE Switch (41) ON.

5. Adjust the X-Band Signal Generator output and the TWT Amplifier gain until the RD-300 Panel Meter (8) indicates 1 kW.

6. Record the voltage reading of the Oscilloscope.

1 kW _____ Volts

7. Repeat Steps 5 and 6 above for Panel Meter (8) readings of 2, 4, 8, 10, and 12 kW. Record the Oscilloscope voltage reading for each power indication below.

Panel Meter Reading (kW)	Oscilloscope Reading (Volts)
1	_____
2	_____
4	_____
8	_____
10	_____
12	_____

8. Plot the voltage versus power readings on Semilog Graph Paper (Volts = Linear, Power = Log).

5-14. DETECTOR OUTPUT LINEARITY TEST (cont'd)

9. The points should lie in a straight line (±10%). The closer the points are to a straight line, the more linear the power output of the Detector Diode.

10. If points begin to veer off the straight line, the X-Band Front End will have to be replaced. (See Calibration Procedures, Section VI)

11. At 3 kW Panel Meter (8) reading, the Oscilloscope should indicate at least 0.26 Volts with a 50 Ohm Load.

5-15A. PANEL METER PEAK POWER ACCURACY TEST. (Using a Radar R/T Unit) (All Units)

DESCRIPTION: The average power output of a Radar R/T Unit is measured with an accurate Power Meter, and the value of the peak power is calculated and compared to the Test Set Panel Meter (8) reading.

SPECIFICATION: ±0.6 dB, 2 kW to 12 kW

EQUIPMENT: Radar R/T Unit, Power Meter with 100 mW Power Head (Thermoelectric type only), 20 dB Coaxial Attenuator (or 30 dB Pad and 10 mW Power Head), Oscilloscope, (Table 5-1).

PROCEDURE:

1. Connect Test Set to Radar R/T Unit.

2. Connect Oscilloscope to DET Connector (24) and terminate in 50 Ohm Load at scope. Trigger scope from SYNC Connector (40).

3. Set Oscilloscope input sensitivity to 50 mV/div and measure pulse width at 50% amplitude points.

Pulse Width (τ) _____ μs

4. Check that PWR/ΔF Switch (7) is in PWR position and note peak power reading on Test Set Panel Meter (8)

(Peak Power) (measured) _____ kW

5. Set PRF/RF Switch (11) to PRF and record measured PRF.

_____ Hz

6. Disconnect Serialized Coaxial Cable from Waveguide Directional Coupler and connect 20 (or 30) dB Coaxial Attenuator and Power Meter to Coupler.

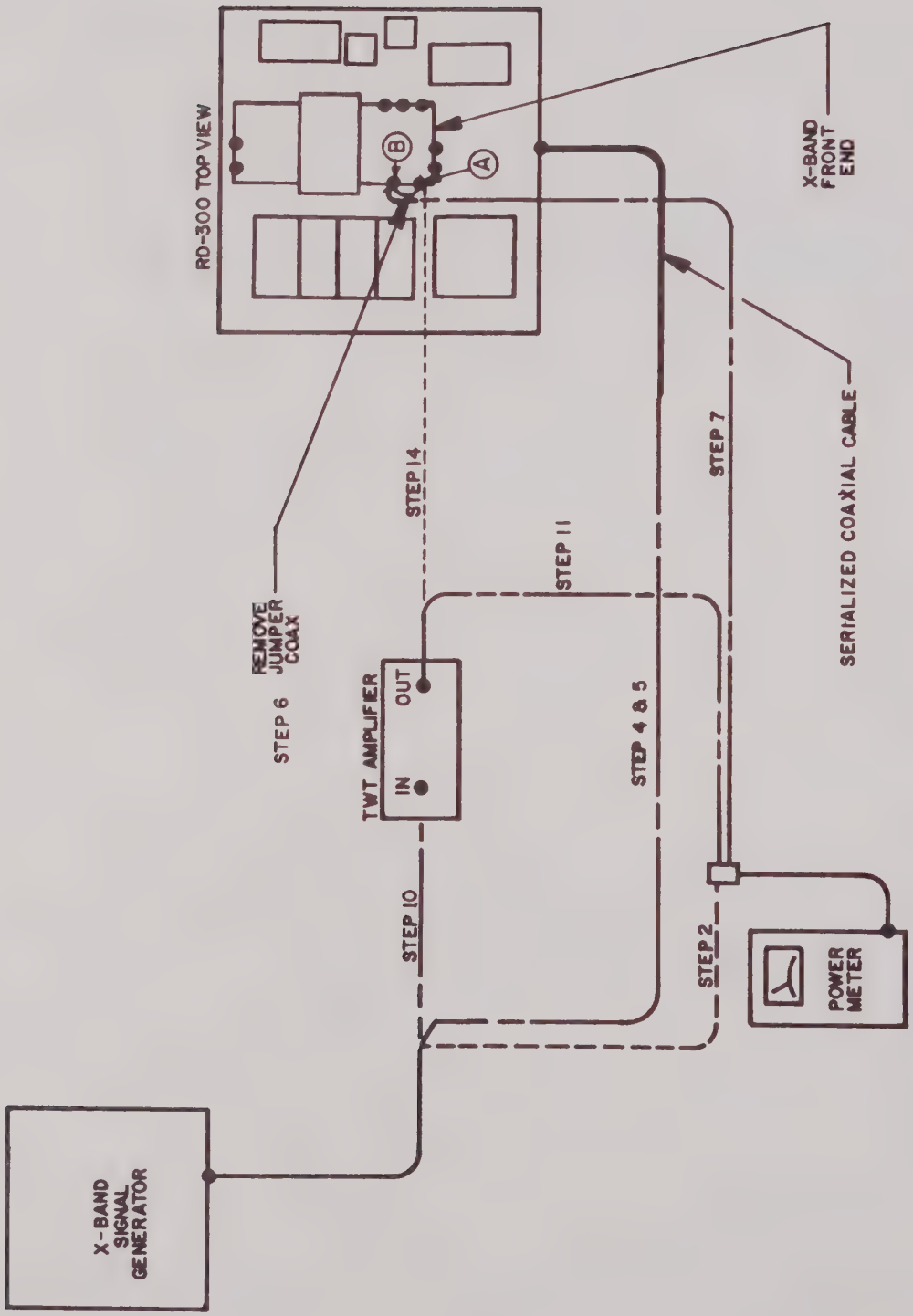


FIG. 5-6 PEAK POWER METER ACCURACY TEST SETUP

5-15A. PANEL METER PEAK POWER ACCURACY TEST (cont'd)

7. Note average power reading on Power Meter.

(Power Average) _____mW

8. Calculate actual power peak from the following equation. Power Peak measurement from Step 4 should agree with calculated value within +14.8, -12.9%.

$$Ppk\ (kW) = \frac{Pav\ (in\ mW) \times K}{\tau\ (in\ \mu s) \times PRF\ (in\ Hz)}$$

Where
Pav = Power Average recorded in Step 7
K = (Mean Coupling Factor)[1] Plus (Actual 20 dB Coaxial Attenuator Loss)-see Table 5-2.
τ = pulse width of Radar R/T Unit measured in Step 3
PRF = Pulse Repetition Frequency of Radar R/T Unit measured in Step 5
Ppk = Peak Power

Ppk (calculated) _____ kW

(Actual 20 dB Coaxial Attenuator Loss) Plus (Mean Coupling Factor)	K (multiplication factor based on dB loss)
39.6 dB	9,120
39.7	9,333
39.8	9,549
39.9	9,772
40.0	10,000
40.1	10,283
40.2	10,471
40.3	10,715
40.4	10,965

Table 5-2. Waveguide Directional Coupler Mean Coupling Factors

[1]See label on Waveguide Directional Coupler.

5-15B. PANEL METER PEAK POWER ACCURACY TEST (Using X-Band Signal Generator and TWT Amplifier) (All Units)

DESCRIPTION: The path loss between the Front Panel RF Output Connector (31) and the Detector Diode is measured. A known amount of CW power that depends on the measurement data is then applied directly to the Detector Diode.

SPECIFICATION: ±0.6 dB, 2 kW to 12 kW

EQUIPMENT: X-Band Signal Generator, Power Meter with 100 mW head, TWT Amplifier, Type N to Type SMA Adaptor (Table 5-1).

PROCEDURE:

1. Press the LINE Switch (41) OFF.

2. Connect the X-Band Signal Generator to the Power Meter with a coaxial cable of appropriate type and length.

3. Set the X-Band Signal Generator controls to CW modulation, to 9375 MHz frequency, and so that the Power Meter indicates 0 dBm output at the end of the coax.

4. Disconnect the coax used in Steps 2 and 3 from the Power Meter Head and connect it to the free end of the Serialized Coaxial Cable.

5. Connect the Serialized Coaxial Cable to the Test Set RF Output Connector (31).

6. Remove the jumper coax between Connectors A and B (Figure 5-6 and Figure 8-38).

7. Use the Type N to Type SMA Adaptor to link Connector B of the X-Band Front End to the Power Meter Head.

8. Record the Power Meter indication at Connector B (nominal -33 dBm, ±2 dB).

_____ dBm

NOTE:

In sets S/N 96 through 99 the X-Band Front End consisted of discrete components which are delineated in Figure 4-1. In this assembly, Connectors A and B are the coaxial connectors that lie between the 30 dB Attenuator and the Detector. Disconnect the Diode and use a 90° Elbow Connector to attach a coax from the Power Meter Head to Connector B. Then record the Power Meter indication in Step 8.

5-15B PANEL METER PEAK POWER ACCURACY TEST (cont'd)

9. Reduce the X-Band Signal Generator output to -40 dBm or below.

10. Disconnect the coax used in Steps 4 and 5 from the serialized coax and connect it to the input of the TWT Amplifier.

11. Using the serialized coax, connect the TWT Amplifier output to the Power Meter Head.

12. Adjust the X-Band Signal Generator output and the TWT Amplifier gain until the Power Meter indicates the end product of the following formula:

    10 kW Power = (+70 dBm) + (Step 8 Data) - (Mean Coupling Factor)[1]

    Example: Step 8 Data = -32.0 dBm
    Mean Coupling Factor = 20.2 dB
    ∴10 kW Power = (+70) + (-32.0) - (20.2)
    = +17.8 dBm
    ∴X-Band Signal Generator output and TWT Amplifier gain should be adjusted until Power Meter reads +17.8 dBm

    CAUTION

    TO PREVENT DAMAGE TO THE DETECTOR DIODE, DO NOT APPLY MORE THAN +20 dBm TO CONNECTOR A.

13. Set PWR/ΔF Switch (7) to PWR.

14. Disconnect the Step 11 serialized coax cable from the Power Meter Head and connect it to X-Band Front End Connector A.

15. Set the X-Band Signal Generator controls for a pulse modulation (3 μs at 380 Hz typically).

16. Press the LINE Switch (41) ON.

17. Verify that the Panel Meter (8) indicates between 8.7 and 11.5 kW.

[1]See label on Waveguide Directional Coupler

5-15B. PANEL METER PEAK POWER ACCURACY TEST (cont'd)

18. Repeat Steps 11 and 12 for the following Power Meter indication:

2 kW Power = (+63 dBm) + (Step 8 Data) - (Mean Coupling Factor)[1]

Example: Step 8 Data = -32.0 dBm
Mean Coupling Factor = 20.2 dB

2 kW Power = (+63) + (-32.0) - (20.2)
= +10.8 dBm

19. Repeat Steps 13 through 17, verifying that the Panel Meter (8) indicates between 1.74 and 2.3 kW.

5-16. CONTOUR MODE LEVEL ACCURACY TEST (All Units)

DESCRIPTION: A Power Meter is used to check the CONTOUR dB Control (14) dial readings against the measured output power levels.

SPECIFICATION: 0 to 20 dB, ±1 dB

EQUIPMENT: Power Meter (Table 5-1)

PROCEDURE:

1. Set controls as follows:

RF/IF Mode (25) . . . . . RF AUX

MODULATION Mode (42). . . . . CW

OUTPUT (18) . . . . . -30 dBm

PRF/RF (11) . . . . . RF

2. Link Power Meter to AUX OUT Connector (22).

3. Adjust MAN FREQ Controls (10) for frequency recorded in Step 4 of Paragraph 5-7.

Frequency _____ MHz

4. Adjust CONTOUR dB Control (14) as noted and measure output levels with Power Meter.

[1]See label on Waveguide Directional Coupler.

5-16. CONTOUR MODE LEVEL ACCURACY TEST (cont'd)

CONTOUR dB CONTROL LEVEL	AUX OUT POWER LEVEL (dBm)			
		MIN	ACTUAL	MAX
0			-30	
2		-29	_____	-27
5		-26	_____	-24
7		-24	_____	-22
10		-21	_____	-19

5. Set OUTPUT dBm Control (18) to -40 dBm

6. Adjust CONTOUR dB Control (14) as noted and measure output levels with Power Meter.

CONTOUR dB CONTROL LEVEL	AUX OUT POWER LEVEL (dBm)			
		MIN	ACTUAL	MAX
12		-29	_____	-27
15		-26	_____	-24
17		-24	_____	-22
20		-21	_____	-19

5-17. RF PULSE WIDTH TEST (All Units)

DESCRIPTION: An Oscilloscope is used to check the WIDTH µs Control (43) dial readings against the measured RF pulse width.

SPECIFICATION: ±20% for 2 to 30 µs Pulse Width
±0.5 µs for 3 µs Pulse Width (Aux Range Ring Mode)
±0.3 µs for 1 µs Pulse Width (Aux Range Ring Mode)
0.1 to 0.4 µs for 0.2 µs Pulse Width (Aux Range Ring Mode).

EQUIPMENT: Detector, Oscilloscope, -12 V dc Power Supply, 100 K, ½ W, 10% Resistor (Table 5-1).

5-17. RF PULSE WIDTH TEST (cont'd)

PROCEDURE:

1. Set controls as follows:

   RF/IF Mode (25) . . . . . RF AUX

   MODULATION Mode (42) . . . . . INT

   RANGE (1) 001

   MAN FREQ (10) . . . . . 9375 MHz

   OUTPUT (18) . . . . . -20 dBm

   CONTOUR (14) . . . . . OFF

   RANGE RING (2) 1

   PRF (44) . . . . . 500 Hz

2. Connect Detector to AUX OUT Connector (22).

3. Connect Oscilloscope to the output of the Detector.

4. Bias Detector output at Oscilloscope with -12 Volts, dc Power Supply through a 100 K Ohm Resistor.

5. Trigger scope from DLYD SYNC Connector (39) and set input sensitivity to 5 mV/div.

6. Adjust Pulse WIDTH µs Control (43) as noted and measure actual pulse width on Oscilloscope at 50% amplitude points.

WIDTH µs CONTROL SETTING	MEASURED PULSE WIDTH (µs)		
	MIN	ACTUAL	MAX
30	24	_____	36
10	8	_____	12
2	1.6	_____	2.4

7. Set RANGE RING Selector (2) to AUX.

5-17. RF PULSE WIDTH TEST (cont'd)

8. Adjust WIDTH µs Control (43) as noted and measure actual pulse width on Oscilloscope at 50% amplitude point.

WIDTH µs CONTROL SETTING	MEASURED PULSE WIDTH (µs)		
	MIN	ACTUAL	MAX
3.0	2.5	_____	3.5
1.0	0.7	_____	1.3
0.2	0.1	_____	0.4

5-18. RF AND AUX PORT AND HIGH POWER TERMINATION VSWR TESTS. (All Units)

DESCRIPTION: A Signal Generator, Spectrum Analyzer, and VSWR Bridge are used to make return loss (VSWR) measurements.

SPECIFICATION:

RF Output Connector (31)	Return Loss	14 dB
	VSWR	1.5:1
AUX OUT Connector (22)	Return Loss	14 dB
	VSWR	1.5:1
Dummy Load	Return Loss	23 dB
	VSWR	1.15:1

EQUIPMENT: X-Band Signal Generator, Spectrum Analyzer, VSWR Bridge and Waveguide to Type N Adaptors (Table 5-1).

PROCEDURE:

1. Connect equipment as in Figure 5-7.
2. In order to determine a return loss reference, leave open the bridge unit-under-test port.
3. Set the X-Band Signal Generator controls:

MODE . . . . . CW

FREQUENCY. . . . . 9295-9425 MHz

LEVEL. . . . . -10 dBm or higher

FIG. 5-7 VSWR TEST SETUP

5-18. RF AND AUX PORT HIGH POWER TERMINATION VSWR TESTS (cont'd)

4. Place at least 10 dB RF attenuation on the Spectrum Analyzer controls. Tune the Spectrum Analyzer to the Signal Generator frequency and measure the reference power level.

Reference Level _____ dBm

5. Connect the VSWR Bridge directly to the RF Output connector (31). Measure the reflected level on the Spectrum Analyzer.

RF Output Reflected Level _____ dBm
AUX OUT Reflected Level _____ dBm
Dummy Load Reflected Level _____ dBm

6. Verify the return loss (difference between levels measured in Steps 4 and 5) is greater than the value in the specification table.

RF Output Return Loss _____ dB

7. Repeat Steps 5 and 6 for AUX OUT Connector (22) and Dummy Load.

AUX OUT Return Loss _____ dB

Dummy Load Return Loss _____ dB

5-19. IF FREQUENCY RANGE TEST (All Units)

DESCRIPTION: The frequency range of the IF Signal Generator is verified on the Digital Display (12).

SPECIFICATION: 20 to 70 MHz.

PROCEDURE:

1. Set controls as follows:

RF/IF Mode (25) . . . . . IF LO

SWP WIDTH (3) . . . . . OFF

2. Vary MAN FREQ Controls (10) and note readout on Digital Display (12).

3. Adjust MAN FREQ Controls (10) to full ccw. Digital Display (12) should read 20 MHz maximum.

_____ 20 MHz

5-19. IF FREQUENCY RANGE TEST (cont'd)

4. Adjust MAN FREQ Controls (10) to full cw. Digital Display (12) should read 70 MHz minimum.

70 MHz _____

5-20. IF OUTPUT FREQUENCY SENSITIVITY TEST (All Units)

DESCRIPTION: The IF output power level is monitored with a Power Meter as the frequency is varied through the IF range and the maximum deviation from the actual level is measured.

SPECIFICATION: ±2 dB of OUTPUT dB Control (13) Setting

EQUIPMENT: Power Meter (Table 5-1)

PROCEDURE:

1. Set controls as follows:

RF/IF Mode (25)	IF HI
MODULATION Mode (42)	CW
OUTPUT (13)	0 dBm
PRF/RF (11)	RF
SWP WIDTH (3)	OFF

2. Connect Power Meter to IF Output Connector (26).

3. Use MAN FREQ Controls (10) to vary IF frequency through entire range and note maximum and minimum levels of output power on the Power Meter.

4. Maximum and minimum levels should both be within 2 dB of 0 dBm.

Max. Level _____ = ≤2 dBm
Min. Level _____ = ≥-2 dBm

5. Set controls as follows:

RF/IF Mode (25)	IF LO
OUTPUT (18)	-20 dBm

6. Use MAN FREQ Controls (10) to vary IF frequency through entire range and note maximum and minimum levels of output power on the Power Meter.

5-20. IF OUTPUT FREQUENCY SENSITIVITY TEST (cont'd)

7. Maximum and minimum levels should both be within 2 dB of -20 dBm.

Max. Level _____ = ≤-18 dBm
Min. Level _____ = ≥-22 dBm

5-21. IF OUTPUT LEVEL ACCURACY TEST (All Units)

DESCRIPTION: The IF level accuracy for the OUTPUT dBm Control (18) ranges down to -20 dBm and can be measured with a Power Meter. Lower output ranges are checked by establishing a reference level on a Spectrum Analyzer Display, stepping the OUTPUT dBm Control (18) and Spectrum Analyzer stepped log reference level control together and measuring any amplitude variations on the Spectrum Analyzer display. A 40 dB Amplifier is used to amplify the output levels below -70 dBm.

SPECIFICATIONS:
IF LO: -20 to -132 dBm, ±2 dB
[-20 to -130 dBm, ±2 dB][1]
IF HI: +20 to -92 dBm, ±2 dB
[+20 to -90 dBm, ±2 dB][1]

EQUIPMENT: Spectrum Analyzer, Power Meter, 40 dB Amplifier (Table 5-1)

PROCEDURE:

1. Set controls as follows:

RF/IF Mode (25). . . . . IF HI

MODULATION Mode (42). . . . . CW

PRF/RF (11). . . . . RF
SWP WIDTH (3) . . . . . OFF

2. Adjust MAN FREQ Controls (10) for Digital Display (12) Reading of 30 MHz.

3. Set Power Meter controls to measure +20 dBm and connect it to IF Output Connector (26) on Test Set.

[1]Units S/N 282 on

5-21. IF OUTPUT LEVEL ACCURACY TEST (cont'd)

4. Set Test Set OUTPUT dBm Control (18) to +20 dBm and step through the positions of the OUTPUT dB Control (13) as noted. Check Power Meter readings to verify that output level is within the specified tolerance. Actual readings should be in 1 dB increments (±0.5 dB).

TEST SET OUTPUT dBm CONTROL SETTING	POWER METER READING (dBm)		
	MIN	ACTUAL	MAX
+20	+18	_____	+22
+19		_____	
+18		_____	
+17		_____	
+16		_____	
+15		_____	
+14		_____	
+13		_____	
+12		_____	
+11		_____	
+10		_____	
[+9][1]		_____	
[+8]		_____	

5. Set OUTPUT dB Control (13) to 0 and step through OUTPUT dBm Control (18) positions as noted. Check Power Meter readings to verify that output level is within the specified tolerance. Actual readings should be in 10 dB increments (±1 dB).

TEST SET OUTPUT dBm CONTROL SETTING	POWER METER READING (dBm)		
	MIN	ACTUAL	MAX
+20	+18	_____	+22
+10	+8	_____	+12
0	-2	_____	+2
-10	-12	_____	-8
-20	-22	_____	-18

[1] In sets prior to S/N 282 only

5-21. IF OUTPUT LEVEL ACCURACY TEST (cont'd)

6. Disconnect Power Meter from Test Set and set controls on Spectrum Analyzer as follows:

Center Frequency	30 MHz
Resolution Bandwidth	10 kHz
Scan Width	0.5 MHz
Input Attenuation	0 dB
Log Reference Level	-10
Vertical Scale Resolution	2 dB/div
Video Filter	300 Hz

7. Connect Spectrum Analyzer to IF Output Connector (26) on Test Set and center signal on Analyzer Display. Consider the center horizontal graticule line equivalent to -20 dBm and use the vertical scale reference vernier control to set the signal peak to be equal to the last measured level on the Power Meter in step 5.

NOTE

For example: If the last Power Meter reading was -20.4 dBm, with a vertical scale resolution of 2 dB/division, the signal peak should be 0.4 dB or 0.2 division below the center (reference) graticule line.

8. Select IF LO Mode on RF/IF Mode Selectors (25) on Test Set.

9. Step through the positions of the OUTPUT dBm Control (18) and set the Spectrum Analyzer Stepped Log Reference Level Control as noted. Check Spectrum Analyzer levels to verify that output level of Test Set is within ±2 dB (1 division) of the center (reference) graticule line. Actual readings should be in 10 dB increments (±1 dB).

5-21. IF OUTPUT LEVEL ACCURACY TEST (cont'd)

TEST SET OUTPUT dBm CONTROL SETTING	SPECTRUM ANALYZER			
	STEPPED LOG REFERENCE LEVEL SETTING (dBm)	DISPLAY AMPLITUDE OFFSET FROM REFERENCE (dB)		
		MIN	ACTUAL	MAX
-20	-10	-2.0	_____	+2.0
-30	-20		_____	
-40	-30		_____	
-50	-40		_____	
-60	-50		_____	
-70	-60		_____	

10. Connect 40 dB Amplifier between IF Output Connector (26) on Test Set and Spectrum Analyzer input.

11. Set stepped Log Reference Level Control on Spectrum Analyzer to -20 dB and adjust Log Reference Level Vernier Control to position the display to correspond to the last level measured in Step 9. The center horizontal graticule is the reference line, as in Step 7.

12. Step through the positions of the OUTPUT dBm Control (18) and set the Spectrum Analyzer Stepped Log Reference Level Control as noted. Check Spectrum Analyzer levels to verify that Test Set output level is within ±2 dB (1 division) of center (reference) graticule line. Actual readings should be in 10 dB increments (±1 dB).

TEST SET OUTPUT dBm CONTROL SETTING	SPECTRUM ANALYZER			
	STEPPED LOG REFERENCE LEVEL SETTING (dBm)	DISPLAY AMPLITUDE OFFSET FROM REFERENCE (dB)		
		MIN	ACTUAL	MAX
-70	-20	____	SET LEVEL	____
-80	-30		_____	
-90	-40		_____	
-100	-50		_____	
-110	-60		_____	

5-21. IF OUTPUT LEVEL ACCURACY TEST (cont'd)

13. Set Spectrum Analyzer Vertical Scale Resolution to 10 dB/ division. Adjust Log Reference Level Vernier to set signal to -10 dB graticule line (one major division from top of display) plus last recorded entry from Step 12.

14. Set OUTPUT dBm Control (18) on Test Set to -120 dBm and check that amplitude level on Analyzer Display is within ±2 dB of -20 dB graticule line (second major division from top of display).

(120 dBm) -2 dB _____ +2 dB

NOTE

- If Step 14 appears to be out of specification, check the accuracy of the Analyzer Display with an external, Calibrated Attenuator.
- The noise level on the Analyzer Display should be 10 dB below the signal level. The signal should drop into the noise when the OUTPUT dB Control (13) is set to full ccw.

5-22. IF ON/OFF RATIO TEST (All Units)

DESCRIPTION: A Spectrum Analyzer is used to determine the difference between the power levels of the ON and OFF states of the IF Power Output.

SPECIFICATION: OFF state should be more than 48 dB below ON state power level.

EQUIPMENT: Spectrum Analyzer

PROCEDURE:

1. Set controls as follows:

RF/IF Mode (25) . . . . . IF HI

OUTPUT dBm (18) . . . . . +20 dBm

MODULATION Mode (42) . . . . . CW

PRF/RF (11) . . . . . RF

MAN FREQ (10) . . . . . 30 MHz

SWP WIDTH (3) . . . . . OFF

5-22. IF ON/OFF RATIO TEST (cont'd)

2. Connect Spectrum Analyzer to IF Output Connector (26).

3. Measure power level on Spectrum Analyzer.

ON Level _____ dBm

4. Select EXT (+) MODULATION Mode. Do not apply an external trigger.

5. Measure power level on Spectrum Analyzer.

OFF Level _____ dBm

6. IF ON/OFF ratio is the difference between ON Level (Step 3) and OFF Level (Step 5). ON/OFF ratio should be greater than 48 dB.

48 dB _____

5-23. IF SWEEP TEST (All Units)

DESCRIPTION: A Spectrum Analyzer is used to measure the sweep width of the IF signal and an Oscilloscope is used to check the SCOPE SWEEP Connector (34) output.

SPECIFICATION: 0 to 4 MHz, ±10%

EQUIPMENT: Spectrum Analyzer, Oscilloscope (Table 5-1)

PROCEDURE:

1. Set controls as follows:

RF/IF Mode (25). . . . . IF LO

MODULATION Mode (42) . . . . . CW

OUTPUT (18). . . . . -20 dBm

2. Connect Spectrum Analyzer to IF Output Connector (26).

3. Set Spectrum Analyzer controls for 30 kHz bandwidth and 500 kHz/div span. Center Spectrum Display.

4. Adjust SWP WIDTH MHz Control (3) to 2 MHz.

5. Measure width of IF sweep on Spectrum Analyzer. Sweep width should be 2 MHz (±0.2 MHz).

1.8 MHz _____ 2.2 MHz

5-23. IF SWEEP TEST (cont'd)

6. Adjust SWP WIDTH MHz Control (3) to 4 MHz.

7. Measure width of IF sweep on Spectrum Analyzer. Sweep width should be 4 MHz (±0.4 MHz).

3.6 MHz _____ 4.4 MHz

8. Connect Oscilloscope to SCOPE SWEEP Connector (34).

9. Measure peak-to-peak voltage of 100 Hz ramp on Oscilloscope. Peak-to-Peak voltage should measure no less than 2.5 V.

2.5 Volts peak-to-peak _____

5-24. IF PULSE WIDTH TEST (All Units)

DESCRIPTION: The pulse width of the IF output signal is measured with an Oscilloscope.

SPECIFICATION: Width µs Control (43) setting, ±20%

EQUIPMENT: Oscilloscope, 50 ohm load (Table 5-1)

PROCEDURE:

1. Set controls as follows:

RF/IF Mode (25)	IF LO
MODULATION Mode (42)	INT
RANGE (1)	001
RANGE RING (2)	1
MAN FREQ (10)	30 MHz
OUTPUT (18)	-20 dBm
PRF (44)	500 Hz
SWP WIDTH (3)	OFF

2. Connect Oscilloscope to IF Output Connector (26). Trigger scope from DLYD SYNC Connector (39).

3. Adjust WIDTH µs Control (43) to 2 µs.

5-24. IF PULSE WIDTH TEST (cont'd)

4. Measure pulse width of IF signal on Oscilloscope. Pulse width should be 2 µs, ±0.4 µs.

1.6 µs_____2.4 µs

5. Adjust WIDTH µs Control (43) to 20 µs.

6. Measure pulse width of IF signal on Oscilloscope. Pulse width should be 20 µs, ±4 µs.

16 µs_____24 µs

7. Adjust WIDTH µs Control (43) to 30 µs.

8. Measure pulse width of IF signal on Oscilloscope. Pulse width should be 30 µs, ±6 µs.

24 µs_____36 µs

5-25. MARKER LEVEL TEST (All Units)

DESCRIPTION: A Spectrum Analyzer is used to measure the power level of the marker signal with respect to the IF carrier signal level.

SPECIFICATION: Maximum -35 dBc at 30 and 60 MHz

EQUIPMENT: Spectrum Analyzer (Table 5-1)

PROCEDURE:

1. Set controls as follows:

RF/IF Mode (25). . . . . IF LO

MODULATION Mode (42) . . . . . CW

OUTPUT (18). . . . . -20 dBm

PRF/RF (11). . . . . RF
SWP WIDTH (3) . . . . . OFF

2. Connect Spectrum Analyzer to IF Output Connector (26).

3. Adjust MAN FREQ Controls (10) for 30 MHz.

4. Press and hold DISPLAY MKR Switch (29) and adjust MKR FREQ Control (9) for 31 MHz.

5-25. MARKER LEVEL TEST (cont'd)

PROCEDURE:

5. On Spectrum Analyzer, note that when DISPLAY MKR Switch (29) is pressed, marker power level is not more than 35 dB below IF carrier power level.

-35 dBc_____

6. Adjust MAN FREQ Controls (10) for 60 MHz.

7. Press and hold DISPLAY MKR Switch (29) and adjust MKR FREQ Control (9) for 61 MHz.

8. On Spectrum Analyzer, note that when DISPLAY MKR Switch (29) is pressed, marker power level is not more than 35 dB below IF carrier power level.

-35 dBc_____

5-26. MARKER OSCILLATOR FREQUENCY RANGE (All Units)

DESCRIPTION: The frequency range of the Marker Oscillator is verified on the Digital Display (12).

SPECIFICATION: 20 to 70 MHz.

PROCEDURE:

1. Set PRF/RF Switch (11) to RF position.

2. Press and hold DISPLAY MKR Switch (29) and adjust MKR FREQ Control (9) full ccw. Digital Display (12) should read less than 20 MHz.

_____20 MHz

3. Press and hold DISPLAY MKR Switch (29) and adjust MKR FREQ Control (9) full cw. Digital Display (12) should read greater than 70 MHz.

70 MHz _____

5-27. INTERNAL PRF OSCILLATOR RANGE TEST (All Units)

DESCRIPTION: The frequency range of the PRF Oscillator is verified on the Digital Display (12).

SPECIFICATION: 50 to 500 Hz, ±10%

PROCEDURE:

1. Set controls as follows:

   MODULATION Mode (42). . . . . INT

   PRF/RF (11) . . . . . PRF

2. Adjust PRF Hz Control (44) to 400 Hz position and note that Digital Display (12) reads 400 Hz, ±40 Hz.

   360 Hz_____440 Hz

3. Adjust PRF Hz Control (44) to 100 Hz position and note that Digital Display (12) reads 100 Hz, ±10 Hz.

   90 Hz_____110 Hz

4. Adjust PRF Hz Control (44) to 50 Hz position and note that Digital Display (12) reads 50 Hz, ±5 Hz.

   45 Hz_____55 Hz

5. Adjust PRF Hz Control (44) to 500 Hz position and note that Digital Display (12) reads 500 Hz, ±50 Hz.

   450 Hz_____550 Hz

5-28. EXTERNAL TRIGGERING TEST (All Units)

DESCRIPTION: An Oscilloscope is used to measure the minimum level which will trigger the external modulation circuits.

SPECIFICATION: Trigger level less than 2 V

EQUIPMENT: Signal Generator, Dual Trace Oscilloscope (Table 5-1)

5-28. EXTERNAL TRIGGERING TEST (cont'd)

PROCEDURE:

1. Set controls as follows:

   µS/NM (45) . . . . . µS
   [µS/MILES. . . . . µS][1]

   RANGE RING (2) 1

   CONTOUR (14) . . . . . OFF (detent)

2. Connect DLYD SYNC Connector (39) to Oscilloscope Channel A.

3. Connect Signal Generator to EXT Connector (38) on Test Set and to Oscilloscope Channel B.

4. Trigger scope from positive edge of Signal Generator input.

5. Select EXT (+) MODULATION Mode.

6. Set Signal Generator controls for square wave output, to 500 Hz.

7. Adjust output level of Signal Generator until delayed sync pulse appears. Vary Signal Generator frequency from 50 to 500 Hz and note that highest, output level required to trigger delayed sync pulse is less than 2 Volts.

   _____2 Volts

8. Select EXT (-) MODULATION Mode.

9. Trigger scope from negative edge of Signal Generator input.

10. Adjust output level of Signal Generator until delayed sync pulse appears. Vary Signal Generator frequency from 50 to 500 Hz and note that highest output level required to trigger delayed sync pulse is less than 2 Volts.

    _____2 Volts

[1]Units prior to S/N 109

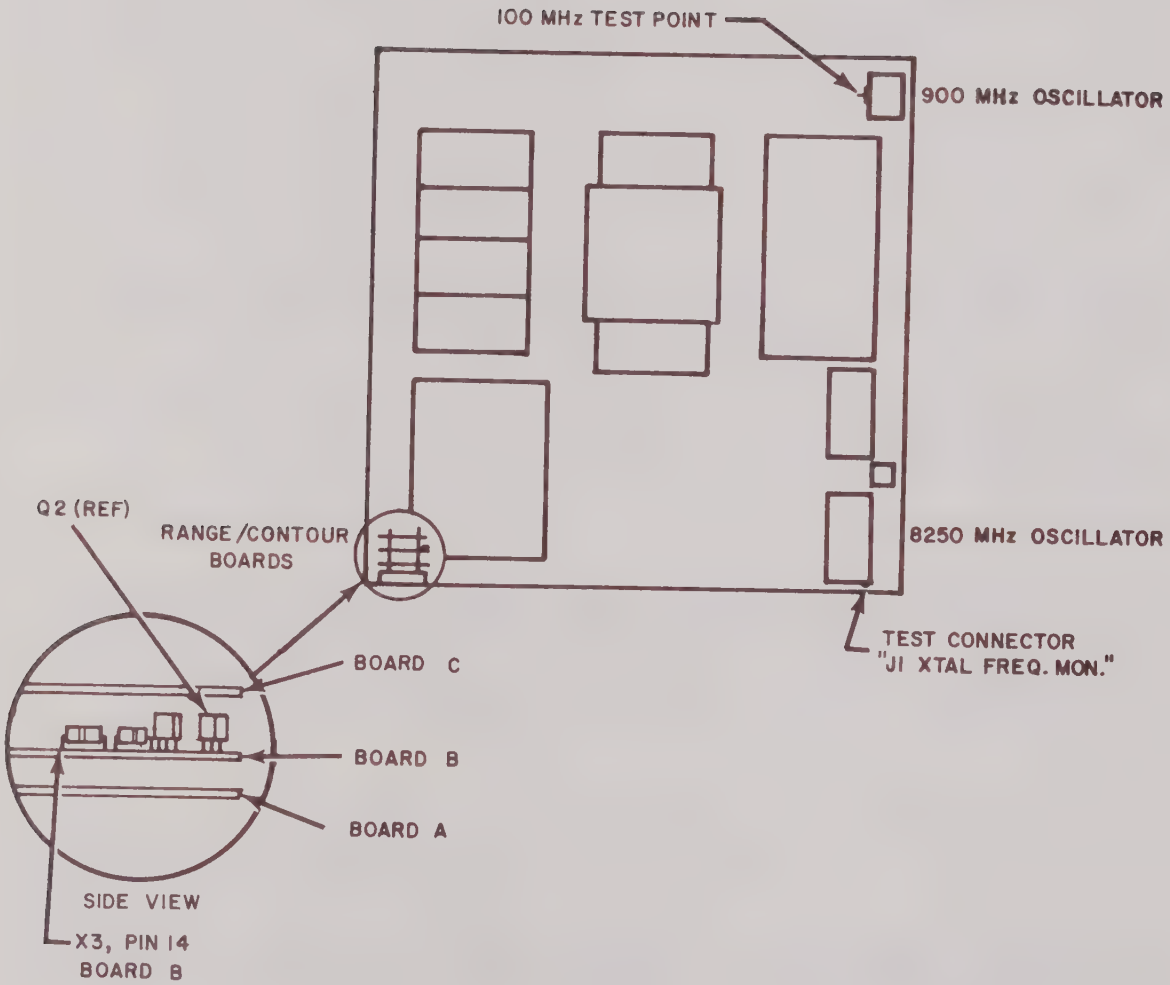


FIG. 5-8 REFERENCE FREQUENCIES TEST POINT LOCATIONS

5-29A. RF FREQUENCY ACCURACY TEST. (Using a Microwave Frequency Counter) (All Units)

DESCRIPTION: A Frequency Counter is used to measure the RF output frequency.

SPECIFICATION: RF output frequency within ±0.5 MHz of the indicated frequency.

EQUIPMENT: Microwave Frequency Counter (Table 5-1).

PROCEDURE:

1. Set controls as follows:

   MODULATION (42) . . . . . CW

   PRF/RF (11) . . . . . RF

   RF/IF Mode (25) . . . . . RF AUX

   OUTPUT dBm (18) . . . . . -20 dBm

   CONTOUR (14) . . . . . 20 dB

2. Adjust MAN FREQ Controls (10) until Digital Display (12) reads 9375.00 MHz.

3. Connect the Microwave Counter to the AUX OUT Connector (22) and adjust counter controls until a stable reading is obtained.

4. Verify the Microwave Frequency Counter reading is within ±0.5 MHz of the Digital Display (12).

   9374.5 MHz _____ 9375.5 MHz

5-29B RF FREQUENCY ACCURACY TEST. (Using a 125 MHz Frequency Counter) (All Units)

DESCRIPTION: A VHF Frequency Counter is used to measure the three Oscillators that determine the output frequency accuracy.

SPECIFICATIONS: 900 MHz Transfer Oscillator Test port frequency: 100 MHz, ±7 kHz.
8250 MHz Transfer Oscillator Test port frequency: 105.769 MHz or 103.125 MHz, ±2 kHz, depending upon Oscillator model.
10 MHz Master Clock Frequency: 10 MHz, ±500 Hz

5-29B. RF FREQUENCY ACCURACY TEST. (cont'd)

EQUIPMENT: VHF Frequency Counter. (Table 5-1)

PROCEDURE:

1. Remove the Test Set top cover.

2. Connect the VHF Frequency Counter to the 900 MHz Oscillator's 100 MHz Reference Test Point (See Figure 5-8). Verify that the frequency is 100 MHz, ±7 kHz.

   99.993 MHz _____ 100.007 MHz

3. Connect the VHF Frequency Counter to the 8250 MHz Oscillator SMA Test Connector (See Figure 5-8). The frequency read-out will depend upon the model of the 8250 MHz Oscillator of the particular unit.

   Narda, Model 821-M2-001
   105.767 to 105.771 MHz
   Microwave Associates, Model PLM 085001
   103.123 to 103.127 MHz
   SST, Model SSX-0115(C)
   103.123 to 103.127 MHz

   105.767 MHz _____ 105.771 MHz

   103.123 MHz _____ 103.127 MHz

4. Connect the VHF Frequency Counter to the 10 MHz Master Clock at X3, Pin 14, Board B, Range/Contour Board (See Figure 5-8). Verify the frequency is 10 MHz, ±500 Hz.

   9.999500 MHz _____ 10.000500 MHz

5-30. ANTENNA SIMULATOR TESTS (All Units)

DESCRIPTION: The 115 V to 26.4 or 6.6 V transformer is checked using an external 115 V, 400 Hz source. The synchro and resolver output levels are checked using an external 26.4 V, 400 Hz source. The linear pot simulator is checked using an external +5 V dc.

SPECIFICATION: Synchro or resolver absolute voltages ±10% from nominal values, the ratios between the phases ±3%.

EQUIPMENT: Digital Voltmeter, Dual Trace Oscilloscope, 5 V Power Supply, 115 V and 26.4 V, 400 Hz Reference Source (Table 5-1). Synchro and Resolver Load Simulators (Figure 5-9).

5-30. ANTENNA SIMULATOR TESTS (cont'd)

PROCEDURE:

1. Connect 115 Volt, 400 Hz reference source to ANT SIMULATOR Connector (37) Pins A and B.

2. Use Digital Voltmeter to measure ac voltage between ANT SIMULATOR Connector (37) Pins F and E. Voltmeter should indicate 6.8 V (±0.35 V) with no load.

   6.45 V rms _____ 7.15 V rms

3. Use Digital Voltmeter to measure ac voltage between ANT SIMULATOR Connector (37) Pins F and C. Voltmeter should indicate 26.4 V (±1.4 V) with no load.

   25.0 V rms _____ 27.8 V rms

4. Connect Synchro Phase Load to ANT SIMULATOR Connector (see Figure 5-9[A]) and set controls as follows:

   ANT RATE (32) ..... (detent) OFF

   ANTENNA QUADRANT (35) ..... LEFT

   ANGLE (33) 00

5. Connect 26.0 V, 400 Hz source to J73-D (hot) and J73-Z (common). Measure ac voltage between synchro phase Y and Z (Pin J and K) outputs with voltmeter. Voltmeter should indicate 10.4 V (±1.04 V).

   Phase Y-Z 9.36 _____ 11.44 V rms

6. Set ANGLE Selectors (33) to 45.

7. Measure ac voltage between synchro phase Y and Z (Pin J and K) outputs with voltmeter. Voltmeter should indicate 11.6 V (±1.15 V).

   Phase Y-Z 10.45 V _____ 12.75 V

8. Measure ac voltage between synchro phase Z and X (Pin K and H) outputs with voltmeter. Voltmeter should indicate 3.10 V (±0.31 V).

   Phase Z-X 2.79 V rms _____ 3.41 V rms

5.30. ANTENNA SIMULATOR TESTS (cont'd)

9. Measure ac voltage between synchro phase X and Y (Pin H and J) outputs with voltmeter. Voltmeter should indicate 8.50 V (±0.85 V).

   Phase X-Y 7.65 V rms _____ 9.35 V rms

10. Set ANGLE Selectors (33) to 89.

11. Measure ac voltage between synchro phase Y and Z (Pins J and K) outputs with voltmeter. Voltmeter should indicate 6.17 V (±.62 V).

    Phase Y-Z 5.55 V rms _____ 6.79 V rms

12. Disconnect Synchro Phase Load from ANT SIMULATOR Connector (Figure 5-9[A]). Set ANGLE Selectors (33) to 00. Connect Resolver Output Load to ANT SIMULATOR Connector (Figure 5-9[B]).

13. Measure Sine Resolver output voltage between Pins R and S with voltmeter. Voltmeter should indicate 0.0 to 0.08 V.

    Sine Resolver 0.0 V _____ 0.08 V rms

14. Measure Cos Resolver output voltage between Pins L and M with voltmeter. Voltmeter should indicate 12.6 V (±1.2 V).

    Cos Resolver 11.4 V rms _____ 13.8 V rms

15. Set ANGLE Selectors (33) to 30.

16. Measure Sine Resolver output voltage between Pins R and S with voltmeter. Voltmeter should indicate 6.3 V (±0.6 V).

    Sine Resolver 5.7 V rms _____ 6.9 V rms

17. Measure Cos Resolver output voltage between Pins L and M with voltmeter. Voltmeter should indicate 10.91 V (±1 V).

    Cos Resolver 9.91 V rms _____ 11.91 V rms

18. Set ANGLE Selectors (33) to 45.

19. Measure Sine Resolver output voltage between Pins R and S with voltmeter. Voltmeter should indicate 8.91 V (±0.9 V).

    Sine Resolver 8.01 V rms_____ 9.81 V rms

5-30. ANTENNA SIMULATOR TESTS (cont'd)

20. Measure Cos Resolver output voltage between Pins L and M with voltmeter. Voltmeter should indicate 8.91 V (±0.9 V).

    Cos Resolver 8.01 V rms_____ 9.81 V rms

21. Set ANGLE Selectors (33) to 89.

22. Measure Sine Resolver output voltage between Pins R and S with voltmeter. Voltmeter should indicate 12.60 V (±1.2 V).

    Sine Resolver 11.4 V rms_____ 13.8 V rms

23. Measure Cos Resolver output voltage between Pins L and M with voltmeter. Voltmeter should indicate 0.219 V (±0.11 V).

    Cos Resolver 0.109 V rms_____ 0.329 V rms

24. Center both traces of Dual Trace Oscilloscope.

25. Disconnect 400 Hz reference from Pin D of ANT SIMULATOR Connector (37) and connect to Pin W.

26. Connect Oscilloscope Channel A to Pin W.

27. Connect Oscilloscope Channel B to Pin R. Jumper Pin S to Pin Z.

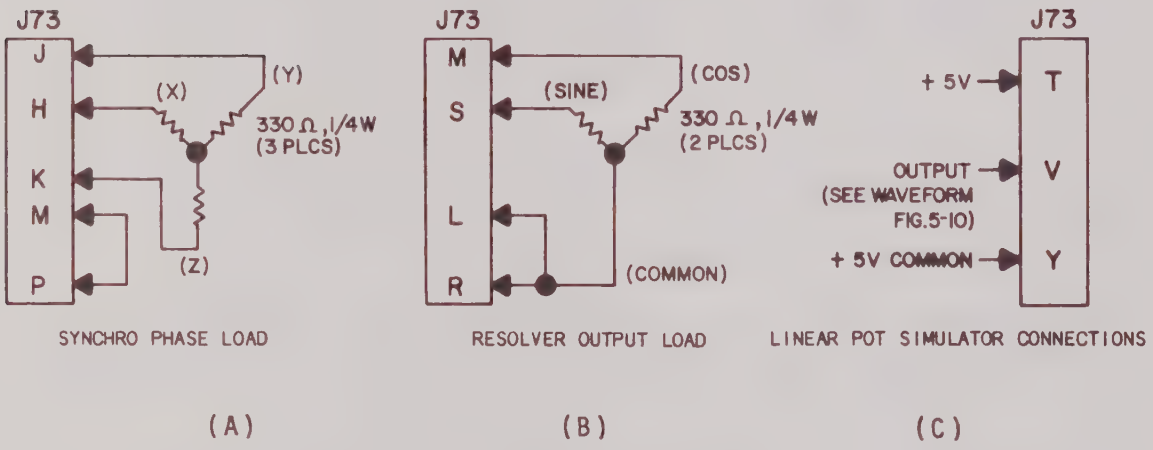
28. Set scope horizontal sweep rate to 10 µs/div, dc coupling.

29. Measure delay between zero crossings of waveforms. Delay should be 55.55 µs (41.67 to 83.33 µs).

30. Disconnect 400 Hz reference from ANT SIMULATOR Connector (37).

5-30. ANTENNA SIMULATOR TESTS (cont'd)

31. Select max scan rate for following test. Connect +5 Volt Power Supply to linear pot simulator connections of ANT SIMULATOR Connector (37) as shown in Figure 5-9(C). (See also Figure 8-17 through 8-20.)



Antenna Simulator Connector
Figure 5-9

32. Use the oscilloscope to verify the waveform below.

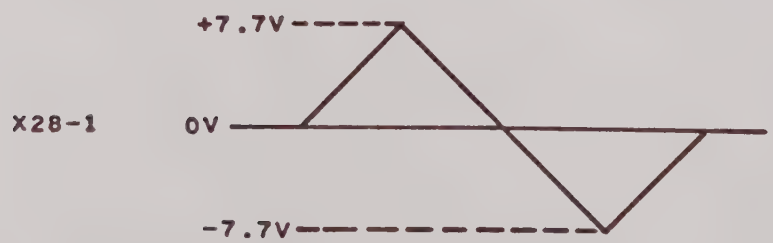


Figure 5-10 ANT SIMULATOR Waveform

PERFORMANCE TEST RECORD

MODEL RD-300 RADAR TEST SET

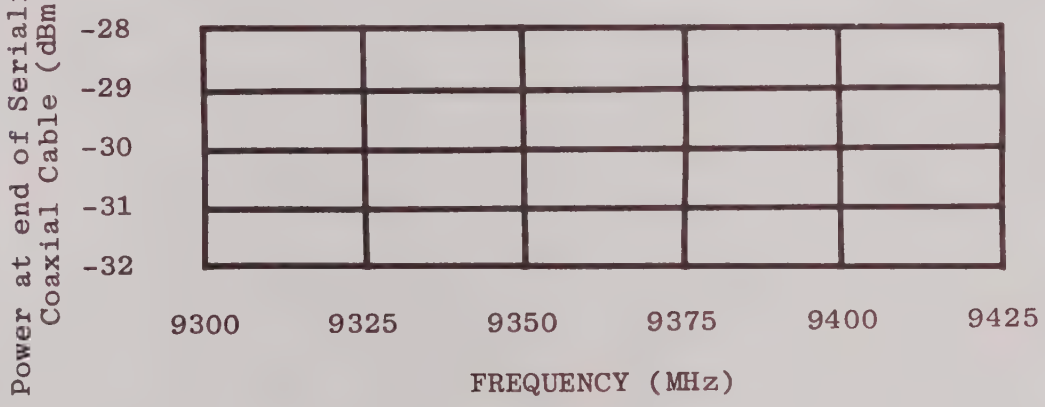
SERIAL NO. _____

TESTED BY _____

DATE _____

PARA NO.	TEST DESCRIPTION	RESULTS MIN	RESULTS ACTUAL	RESULTS MAX
5-5	MANUAL FREQUENCY RANGE TEST			
	Low End of Band		_____	9295 MHz
	High End of Band	9425 MHz	_____	
5-6	RF OUTPUT FREQUENCY SENSITIVITY TEST			

Plot:

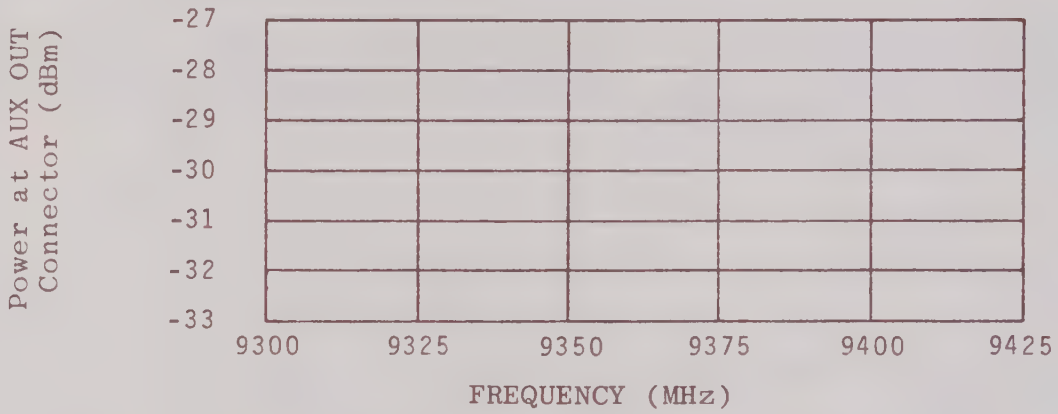


Frequency Corresponding to -30 dBm Output

_____ MHz

PARA NO.	TEST DESCRIPTION	RESULTS MIN	ACTUAL	MAX
5-7	AUX OUT FREQUENCY SENSITIVITY TEST			

Plot:



	Frequency Corresponding to -30 dBm Output _____ MHz			
5-8.	RF OUTPUT ATTENUATION ACCURACY TEST Frequency (from Paragraph 5-6): _____ MHz			
	1 (±0.5) dB steps : -50 dBm		-30 dBm	
	-51 dBm	-31.5 dBm	_____	-30.5 dBm
	-52 dBm	-32.5 dBm	_____	-31.5 dBm
	-53 dBm	-33.5 dBm	_____	-32.5 dBm
	-54 dBm	-34.5 dBm	_____	-33.5 dBm
	-55 dBm	-35.5 dBm	_____	-34.5 dBm
	-56 dBm	-36.5 dBm	_____	-35.5 dBm
	-57 dBm	-37.5 dBm	_____	-36.5 dBm
	-58 dBm	-38.5 dBm	_____	-37.5 dBm
	-59 dBm	-39.5 dBm	_____	-38.5 dBm
	-60 dBm	-40.5 dBm	_____	-39.5 dBm
	(-61 dBm)[1]	-41.5 dBm	_____	-40.5 dBm
	(-62 dBm)	-42.5 dBm	_____	-41.5 dBm

[1] Sets prior to S/N 282 only

PARA NO.	TEST DESCRIPTION	RESULTS MIN	RESULTS ACTUAL	RESULTS MAX
5-8.	RF OUTPUT ATTENUATION ACCURACY TEST (cont'd)			
	10 (±1.0) dB Steps: -50 dBm	-21 dBm	_____	-19 dBm
	-60 dBm	-31 dBm	_____	-29 dBm
	-70 dBm	-31 dBm	_____	-29 dBm
	-80 dBm	-41 dBm	_____	-39 dBm
	-90 dBm	-51 dBm	_____	-49 dBm
	-100 dBm	-61 dBm	_____	-59 dBm
	-110 dBm	-71 dBm	_____	-69 dBm
	-120 dBm	-81 dBm	_____	-79 dBm
5-9.	SPECTRUM ANALYZER OUTPUT ATTENUATION TEST			
	Reference Power Level: ____ dBm			
	Spectrum Analyzer Output Power Level: _____ dBm			
	Calculate Attenuation:			
	(Reference Power Level) - (Spectrum Analyzer Connector Power Level) + (Test Cable Loss)	(____) - (____) + (____) = _____		
		36 dB	_____	48 dB
(For sets with additional 20 dB attenuation)	[For sets S/N 96-99]	56 dB [60 dB]	_____ _____	68 dB [66 dB]
5-10	RF ON/OFF RATIO TEST			
	ON Level: _____ dBm			
	OFF Level: _____ dBm			
	On/Off Ratio	38 dB	_____	
	(For sets with improved Main Diode Switch)	65 dB	_____	

PARA NO.		RESULTS MIN	ACTUAL	MAX
5-11 (A,B)	TRACK MODE ACCURACY TEST Tracking Error at 2 µs or greater R/T Unit Pulse Width PRF _____ _____ µs ___ Hz _____ _____ µs ___ Hz _____ _____ µs ___ Hz _____ _____ µs ___ Hz		_____ _____ _____ _____	25 kHz 25 kHz 25 kHz 25 kHz
5-12 (A,B)	ΔF CONTROL TEST (Units 109 on) Reference Frequency: _____ MHz +0.5 MHz Offset -0.5 MHz Offset	 0.47 MHz 0.53 MHz	 _____ _____	 0.53 MHz 0.47 MHz
5-13. (A,B)	DISCRIMINATOR OUTPUT CALIBRATION FACTOR TEST Voltage Level for F = +0.5: _____ Volts Voltage Level for F = -0.5: _____ Volts Voltage Difference	 0.08 V	 _____	 0.12 V
5-14	DETECTOR OUTPUT LINEARITY TEST Detector Output Amplitude: 1 kW 2 kW 4 kW 8 kW 10 kW 12 kW		_____✓ _____✓ _____✓ _____✓ _____✓ _____✓	
5-15A	PANEL METER PEAK POWER ACCURACY TEST (R/T Unit) 3. Pulse Width(τ):_____µs 4. Peak Power (Ppk):_____kW 5. PRF: _____Hz 7. Average Power (Pav): _____mW 8. Calculated Peak Power: $\frac{Pav \times K}{\tau \times PRF}$ = ____kW		$\frac{(\_\_\_\_\_) \times (\_\_\_\_\_)}{(\_\_\_\_\_) \times (\_\_\_\_\_)}$	

PARA NO.	TEST DESCRIPTION	RESULTS		
		MIN	ACTUAL	MAX
5-15B	PANEL METER PEAK POWER ACCURACY TEST (X-Band Signal Generator)			
	17. Power Meter Indication (10 kW)	8.7 kW	_____	11.5 kW
	19. Power Meter Indication (2 kW)	1.74 kW	_____	2.3 kW
5-16	CONTOUR MODE LEVEL ACCURACY TEST			
	-30 dBm Reference Frequency (Para. 5-7): _____ MHz			
	AUX OUT Power Level:			
	Contour dB Control Level			
	0 dB		-30 dBm	
	2 dB	-29 dBm	_____	-27 dBm
	5 dB	-26	_____	-24
	7 dB	-24	_____	-22
	10 dB	-21	_____	-19
	-40 dBm OUTPUT Level:			
	Contour dB Control Level			
	12 dB	-29 dBm	_____	-27 dBm
	15 dB	-26	_____	-24
	17 dB	-24	_____	-22
	20 dB	-21	_____	-19

PARA NO.	TEST DESCRIPTION	RESULTS		
		MIN	ACTUAL	MAX
5-17.	RF PULSE WIDTH TEST			
	Measured Pulse Width: 30 µs	24 µs	_____	36 µs
	10 µs	8 µs	_____	12 µs
	2 µs	1.6 µs	_____	2.4 µs
	3.0 µs	2.5 µs	_____	3.5 µs
	1.0 µs	0.7 µs	_____	1.3 µs
	0.2 µs	0.1 µs	_____	0.4 µs
5-18.	RF AND AUX PORT AND HIGH POWER TERMINATION VSWR TESTS			
	4. Reference Level ____ dBm			
	5. RF Output Reflected Level ____ dBm			
	6. RF Output Return Loss ____ dB			
	5. AUX OUT Reflected Level ____ dBm			
	7. AUX OUT Return Loss ____ dB			
	5. Dummy Load Reflected Level ____ dBm			
	7. Dummy Load Return Loss ____ dB			
5-19.	IF FREQUENCY RANGE TEST			
	3. MAN FREQ ccw		_____	20 MHz
	4. MAN FREQ cw	70 MHz	_____	
5-20.	IF OUTPUT FREQUENCY SENSITIVITY TEST			
	Deviation in IF HI Mode at 0 dBm	-2 dBm	_____	2 dBm
	Deviation in IF LO Mode at -20 dBm	-22 dBm	_____	-18 dBm

PARA NO.	TEST DESCRIPTION	RESULTS MIN	RESULTS ACTUAL	RESULTS MAX
5-21.	IF OUTPUT LEVEL ACCURACY TEST			
	IF HI Power Meter Readings, 1 (±0.5) dB Steps:			
	+20 dBm	+18 dBm	_____	+22 dBm
	+19 dBm		_____	
	+18 dBm		_____	
	+17 dBm		_____	
	+16 dBm		_____	
	+15 dBm		_____	
	+14 dBm		_____	
	+13 dBm		_____	
	+12 dBm		_____	
	+11 dBm		_____	
	+10 dBm		_____	
	[+9 dBm][1]		_____	
	[+8 dBm]		_____	
	IF HI Power Meter Readings, 10 (±1.0) dB Steps:			
	+20 dBm	+18 dBm	_____	+22 dBm
	+10 dBm		_____	
	0 dBm		_____	
	-10 dBm		_____	
	-20 dBm		_____	
	IF LO Spectrum Analyzer Reference Offset Readings:			
	OUTPUT LEVEL / ANALYZER LOG REFERENCE			
	-20 dBm / -10 dBm	-2 dBm	_____	+2 dBm
	-30 dBm / -20 dBm		_____	
	-40 dBm / -30 dBm		_____	
	-50 dBm / -40 dBm		_____	
	-60 dBm / -50 dBm		_____	
	-70 dBm / -60 dBm		_____	
	IF LO Spectrum Analyzer Reference Offset Readings with 40 dB Amplifier:			
	OUTPUT LEVEL / ANALYZER LOG REFERENCE			
	-70 dBm / -20 dBm	_____	SET LEVEL	_____
	-80 dBm / -30 dBm		_____	
	-90 dBm / -40 dBm		_____	
	-100 dBm / -50 dBm		_____	
	-110 dBm / -60 dBm		_____	

[1]In sets prior to S/N 282.

PARA NO.	TEST DESCRIPTION	RESULTS		
		MIN	ACTUAL	MAX
5-21.	IF OUTPUT LEVEL ACCURACY TEST (cont'd) (-120 dBm)	-2	_____	+2
5-22.	IF ON/OFF RATIO TEST ON Level: _____ dBm OFF Level: _____ dBm Ratio	48 dB	_____	
5-23.	IF SWEEP TEST 2 MHz (±0.2 MHz) Sweep 4 MHz (±0.4 MHz) Sweep SCOPE SWEEP AMPLITUDE	1.8 MHz 3.6 MHz 2.5 V pp	_____ _____ _____	2.2 MHz 4.4 MHz
5-24.	IF PULSE WIDTH TEST 2 µs (±0.4 µs) Pulse 20 µs (±4 µs) Pulse 30 µs (±6 µs) Pulse	1.6 µs 16 µs 24 µs	_____ _____ _____	2.4 µs 24 µs 36 µs
5-25.	MARKER LEVEL TEST 30 MHz 60 MHz	-35 dBc -35 dBc	_____ _____	
5-26.	MARKER OSCILLATOR FREQUENCY RANGE Low End of Band High End of Band	70 MHz	_____ _____	20 MHz

PARA NO.	TEST DESCRIPTION	RESULTS MIN	ACTUAL	MAX
5-27.	INTERNAL PRF OSCILLATOR RANGE TEST			
	Pulse Repetition Frequency:			
	400 Hz	360 Hz	_____	440 Hz
	100 Hz	90 Hz	_____	110 Hz
	50 Hz	45 Hz	_____	55 Hz
	500 Hz	450 Hz	_____	550 Hz
5-28.	EXTERNAL TRIGGERING TEST			
	Positive Trigger Level		_____	2 Volts
	Negative Trigger Level		_____	2 Volts
5-29A.	RF FREQUENCY ACCURACY TEST (Microwave Frequency Counter)	MHz		MHz
	9375 MHz Indicated	9374.5	_____	9375.5
5-29B.	RF FREQUENCY ACCURACY TEST (125 MHz Frequency Counter)	MHz		MHz
	100 MHz Reference	99.993	_____	100.007
	105.769 MHz Reference (Narda)	105.767	_____	105.771
	103.125 MHz Reference (Microwave, SST)	103.123	_____	103.127
	10 MHz	9.999500	_____	10.000500
5-30.	ANTENNA SIMULATOR TEST	V rms		Vrms
	2. Pins F and E	6.45	_____	7.15
	3. Pins F and C	25.0	_____	27.8
	5. Pins J and K (Phase Y-Z) at 00°	9.36	_____	11.44
	7. Pins J and K (Phase Y-Z) at 45°	10.45	_____	12.75
	8. Pins K and H (Phase Z-X) at 45°	2.79	_____	3.41
	9. Pins H and J (Phase X-Y) at 45°	7.65	_____	9.35

PARA NO.	TEST DESCRIPTION	RESULTS		
		MIN	ACTUAL	MAX
5-30.	ANTENNA SIMULATOR TEST (cont'd)	V rms		V rms
	11. Pins J and K (Phase Y-Z) at 89°	5.55	_____	6.79
	13. Pins R and S (Sine Resolver) at 00°	0.0	_____	0.08
	14. Pins L and M (Cos Resolver) at 00°	11.4	_____	13.8
	16. Pins R and S (Sine Resolver) at 30°	5.7	_____	6.9
	17. Pins L and M (Cos Resolver) at 30°	9.91	_____	11.91
	19. Pins R and S (Sine Resolver) at 45°	8.01	_____	9.81
	20. Pins L and M (Cos Resolver) at 45°	8.01	_____	9.81
	22. Pins R and S (Sine Resolver) at 89°	11.4	_____	13.8
	23. Pins L and M (Cos Resolver) at 89°	0.109	_____	0.329
	29. Delay 32. Waveform at X28-1	41.67 µs	_____	83.33 µs

SECTION VI

CALIBRATION PROCEDURES

6-1. INTRODUCTION. This section contains procedures designed to return the RD-300 Test Set to peak operating condition. To ensure validity of the calibration adjustments, the RD-300 Radar Test Set should have a 15 minute warm-up period and the line voltage must be: 117 V ac nominal, ±11.7 V ac; or when the Test Set is so wired, 234 V ac nominal, ±16 V ac.

6-2. SAFETY CONSIDERATIONS. This manual contains warnings, notes and procedures that must be followed to ensure safe operation. Any interruption of internal or external groundings may make the Test Set dangerous. Intentional interruption of protective grounding conductors is prohibited. Calibration of the RD-300 Test Set requires working with the set opened and power applied. Any calibration, maintenance, and repair should be performed only by skilled personnel who are aware of the hazards involved.

6-3. EQUIPMENT CONSIDERATIONS. Power to the RD-300 Test Set must be removed during the replacement or removal of any component, not only to ensure personnel safety, but to protect equipment from arcing and subsequent damage. For example: when removing a PC Board and replacing it with an Extender Board attached, disconnect power from the Test Set before removing the PC Board. Then apply power to the Test Set after the PC Board and Extender have been installed.

6-4. ENVIRONMENTAL CONSIDERATIONS. For best results, the RD-300 Test Set calibration environmental conditions should be identical to the environmental conditions at the normal operating location.

6-5. REQUIRED TEST EQUIPMENT. Test equipment required for the Calibration Procedures is listed in Table 6-1. Each Calibration Procedure also specifies required test equipment.

6-6. CALIBRATION PROCEDURE APPLICABILITY. Unless otherwise specified, each procedure is applicable in whole, or in part as indicated, to all models of the RD-300 Test Set. The Calibration Procedures are sequenced to follow a logical order of progression. However, individual procedures may be used to calibrate individual systems providing the required calibration or test of effecting circuitry has been accomplished or verified via the appropriate Performance Evaluation Procedures.

6-7. CORRECTIVE ACTION. Unless otherwise specified, verify the results of each procedure and take corrective action whenever a test or calibration requirement is not met. "Corrective Action" can mean either troubleshooting the Test Set to determine. the component failure and replacing that component or making a mechanical or electrical repair to restore normal operation.

6-8. CALIBRATION RECORD. Results of the Calibration Procedures may be recorded in the Calibration Data Sheet at the end of the Calibration Procedures. The recorded results can be used for comparison in future calibrations, troubleshooting and for reference after repair and inspection.

WARNING

Adjustments described in the calibration procedures are performed with power ON the Test Set with covers removed. Many points, if contacted, may result in personal injury.

Table 6-1

Required Test Equipment

Adaptor, Type N to Type SMA

Amplifier, TWT, Hewlett-Packard Model 495A, or equivalent

Attenuator, 20 dB Coaxial, Texscan FP-50-20 dB, or equivalent

Coaxial Cable, Flexible

Coaxial Tee

Detector, Crystal, Hewlett-Packard Model 423A, or equivalent

50 Ohm Load, Hewlett-Packard Model 10100C, or equivalent

Filter, High Pass, (if required), Addington Laboratories Model 103800239, or equivalent

Frequency Counter (VHF), Fluke Model 1910A, or equivalent

Insulated Screwdriver or Metal Tipped Tuning Tool

Insulated Tuning Tool

Oscilloscope, Tektronix Model 465, 100 MHz, or equivalent

Power Meter, General Microwave Model 460 B Thermoelectric with Model N421D 100 mW Power Head or equivalent.

Power Supply, 12 V dc

Pulse Generator, Wavetek Model 183, or equivalent

Resistor, 1 K Ohm, ¼W, 10%

Resistor, 100 K Ohm, ½W 10%

Signal Generator, L-Band Laboratory, Hewlett-Packard Model 8640B Frequency Double Option 002, or equivalent

Signal Generator, X-Band, Hewlett-Packard Model 8620/86290A, or equivalent

Spectrum Analyzer, Hewlett-Packard Model 140T, with Model 8555A RF Section and Model 8552B IF Section, or equivalent

Voltmeter, Digital (DVM), Fluke Model 830, or equivalent

VSWR Bridge

6-9. METER MECHANICAL ZERO CHECK AND ADJUSTMENT.

DESCRIPTION: This procedure checks and provides adjustment for the mechanical position of the RD-300 Panel Meter (8) pointer with Test Set power OFF.

TEST EQUIPMENT: None

PROCEDURE:

1. Verify that Panel Meter (8) pointer is at scale 0.

_____(✓)

2. To adjust pointer to 0, turn Meter Adjustment Screw, located below center of Panel Meter (8), in either direction.

6-10. INITIAL PROCEDURE

DESCRIPTION: This procedure provides for power application and measurement.

TEST EQUIPMENT: Digital Voltmeter (DVM) (Table 6-1)

PROCEDURE:

1. Ensure that power cable is disconnected from RD-300 Test Set.

2. Remove RD-300 top cover.

3. Using Digital Voltmeter (DVM), verify that the 50 Hz to 400 Hz power source is 117 V ac, ±11.7 V ac, (or 234, ±16, V ac when RD-300 is so wired). Record measured value.

_____V ac

WARNING

SOME VOLTAGES IN THIS EQUIPMENT ARE LETHAL; USE CAUTION WHILE TAKING MEASUREMENTS, MAKING ADJUSTMENTS OR WORKING INSIDE THE TEST SET WHEN POWER CABLE IS SUPPLYING POWER TO SET.

4. Connect the RD-300 to the 117/234 V ac, 50 to 400 Hz power source and press LINE Switch (41) ON. Allow 15 minutes warm-up time before proceeding with calibration procedures.

6-11. POWER SUPPLY VOLTAGE TEST

DESCRIPTION: The RD-300 power supply is mounted on the rear panel and supplies power to all subassemblies. This procedure checks the output voltages of the power supply. Power supply schematics and component designation drawings are in the Schematics and Parts Layouts (Section VIII).

REQUIREMENTS: When the power source is within tolerance, the power supply voltages should be as follows:

VOLTAGES	RIPPLE VOLTAGE
+ 5 V dc (+ 4.7 to + 5.3 V dc)	15 mV p-p Max.
+12 V dc (+11.4 to +12.6 V dc)	15 mV p-p Max.
-12 V dc (-11.4 to -12.6 V dc)	15 mV p-p Max.
-24 V dc (-22.0 to -25.2 V dc)	20 mV p-p Max.
-18 V dc (-17.0 to -19.0 V dc)	0 Volts
+170 V dc (+155 to +180 V dc)	N/A

TEST EQUIPMENT: Digital Voltmeter (DVM), Oscilloscope (Table 6-1)

PROCEDURE:

1. Using a DVM and an Oscilloscope, measure and record voltages and ripple voltages at Test Points listed below. TB-1 is mounted on the Left Side Frame at the rear and numbered from top (1) to bottom (5). Rear Panel Assembly Component & Terminal Ideniification, Drawing 3-25-190, identifies the Rear Panel Components. The Left Side Panel may be removed for access to TB-1. Rear Panel Chassis is ground reference for listed voltage.

TEST POINT	VOLTAGE	RIPPLE VOLTAGE
TB-1-1	(+ 4.7 _____ + 5.3 V dc)	_____(15 mV p-p Max.)
TB-1-2	(+11.4 _____ +12.6 V dc)	_____(15 mV p-p Max.)
TB-1-3	(-11.4 _____ -12.6 V dc)	_____(15 mV p-p Max.)
TB-1-4	(-22.0 _____ -25.2 V dc)	_____(20 mV p-p Max.)
Pin 5 of J-10[1]	(-17.0 _____ -19.0 V dc)	_____(0 Volts)
CR4 Cathode on 170 V Power Supply Bd.	(+155 _____ +180 V dc)	_____N/A

[1]J-10 is 5 pin connector to VCO. Pin 5 is gray wire.

6-12. 10 MHz SYSTEM CLOCK CHECK AND ADJUSTMENT

DESCRIPTION: The 10 MHz clock frequency is monitored at the output of the buffer stage and adjusted for 10 MHz.

REQUIREMENTS: 10 MHz, ±500 Hz

TEST EQUIPMENT: Frequency Counter (VHF), Insulated Tuning Tool (Table 6-1)

PROCEDURE:

1. Connect Frequency Counter to X3, Pin 14 on Range/Contour Board B. (See Fig. 6-1)

NOTE

If the requirement of Step 2 is not met, perform Steps 3 through 10.

2. Frequency Counter should indicate 10 MHz, ±500 Hz.

9.999500 MHz_____10.000500 MHz

NOTE

If Step 3 is not feasible, proceed to Step 4.

3. Using an Insulated Tuning Tool, adjust C-5 on Board B until counter indicates 10 MHz (±500 Hz).

4. Disconnect power from RD-300.

5. Remove the Left Side Cover. From the Side Frame, remove the two screws holding the L-shaped Range/Contour Board mounting bracket.

6. Remove the mounting bracket screws from Board C (back board).

NOTE

Perform Step 7 carefully to avoid breaking plastic spring clips holding the Range Selector Switches to the Front Panel.

7. Remove the shell nuts holding Boards C and B together. Swing Board C out to gain access to Trimmer Capacitor C-5 on Board B.

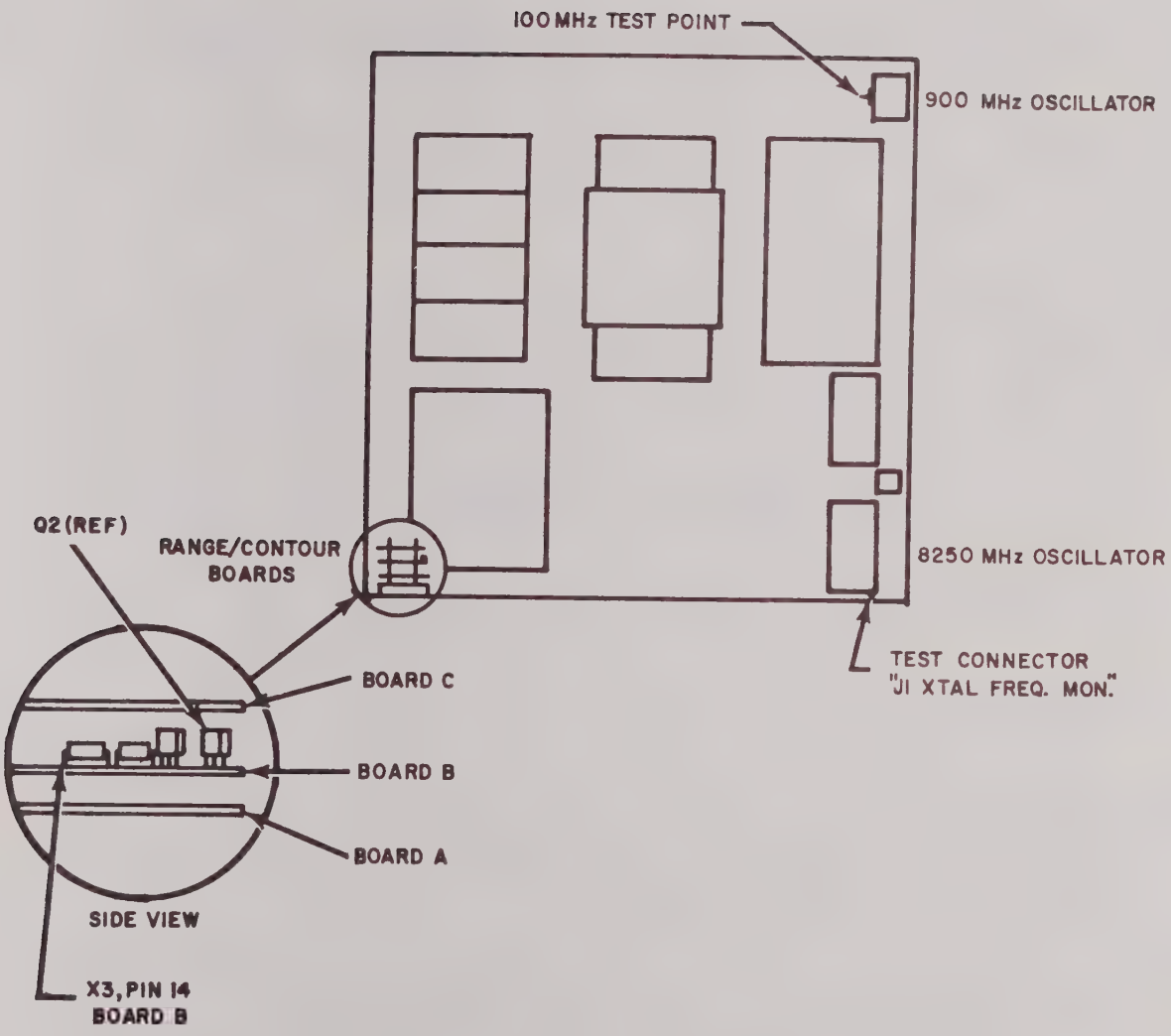


FIG. 6-1 REFERENCE FREQUENCIES TEST POINT LOCATIONS

6-12. 10 MHz SYSTEM CLOCK CHECK AND ADJUSTMENT (cont'd)

8. With Frequency Counter connected as in Step 1, apply power to RD-300.

9. Allow RD-300 to warm-up for 15 minutes. Adjust C-5 on Board B for 10 MHz (±500 Hz) counter indication.

9.999500 MHz_____10.000500 MHz

10. Remove power from RD-300 and reinstall Board C.

6-13. 900 MHz LOCAL OSCILLATOR CALIBRATION

DESCRIPTION: The 100 MHz Oscillator coil is adjusted for proper starting oscillation, the Buffer Amplifier Coil is adjusted for proper multiplication of the 100 MHz signal; and the resonators are adjusted for the correct output power. This procedure should be performed only when a malfunction has been corrected on the 900 MHz Local Oscillator P.C. Bd. Assy.

REQUIREMENTS: Oscillator frequency = 100 MHz (±7 kHz)
Output Level at J-50 = 0 dBm (±2 dB)
Frequency at J-50 = 900 MHz (±63 kHz)

TEST EQUIPMENT: Spectrum Analyzer
Frequency Counter (Table 6-1)

PROCEDURE:

1. Connect the Spectrum Analyzer to TP-1 on the side cover plate of the 900 MHz Local Oscillator Module. Tune analyzer to 100 MHz.

2. Adjust Oscillator Coil L-902 until the analyzer indicates the Crystal Oscillator has "popped" on. Leave the coil in the approximate center of the tuning range. Check for Oscillator starting operation by cycling the LINE Switch (41) OFF and ON.

_____(✓)

3. Adjust Buffer Coil L-905 for maximum 100 MHz signal on the Spectrum Analyzer. It is possible to misadjust L-905 so that the 100 MHz spectrum breaks up. Avoid this tuning point.

_____(✓)

6-13. 900 MHz LOCAL OSCILLATOR CALIBRATION (cont'd)

4. Disconnect the Spectrum Analyzer and connect the Frequency Counter to TP-1.

5. Adjust Oscillator Coil L-902 until the Frequency Counter indicates as close to 100 MHz as possible consistent with reliable Oscillator starting when LINE Switch (41) is cycled. Do not leave the slug any closer than ½ turn from the point at which the Oscillator stops. The Frequency Counter should then indicate 100 MHz (±7 kHz).

99.993 MHz_____100.007 MHz

6. Connect the Spectrum Analyzer to the 900 MHz Output Connector (J-50). Set the Analyzer controls for 900 MHz center frequency. If the 900 MHz signal is not easily found because the two resonators are off tune, adjust the Analyzer controls for maximum sensitivity (10 kHz per division frequency span and 10 dB RF attenuation).

7. Adjust the two resonator screws for 0 dBm (±2 dB) output at J-50. Tighten the screw locking nuts.

-2 dBm_____+2 dBm

8. Disconnect test equipment.

6-14. IF AND MARKER OSCILLATORS CALIBRATION

DESCRIPTION: A Frequency Counter is used to adjust the Marker Oscillator and the IF Oscillator Tune Circuit. A Spectrum Analyzer is used in the Marker Oscillator Level, Sweep Width, and Mixer Balance Adjustment Procedures. Ref. schematics: 3-25-105 (IF & Marker Osc.) and 3-25-119 (Aux. Board).

TEST EQUIPMENT: Frequency Counter
Digital Voltmeter (DVM)
Spectrum Analyzer (Table 6-1)

PROCEDURE:

MARKER OSCILLATOR ADJUSTMENT

1. Disconnect power from RD-300.

2. Disconnect coax. cables from J-53, 54, and 55.

6-14. IF AND MARKER OSCILLATORS CALIBRATION (cont'd)

3. Remove top cover screws and remove the IF/MKR Oscillator and AUX P.C. Boards from their housings. Support the boards on extender brackets or lay them on a cardboard for insulation.

4. Connect Frequency Counter to J-55 on IF & Marker Osc. P.C. Board.

5. Apply power to RD-300.

6. Press DISPLAY MKR Switch (29), and set MARKER FREQ Control (9) full cw. Adjust C-34 on IF & Marker Osc. P.C. Board until Frequency Counter indicates 76 to 77 MHz. After a 20 minute warm-up period, the counter should indicate the stabilized frequency of 72 to 74 MHz. If necessary, readjust C-34.

72 MHz_____74 MHz

7. While pressing the DISPLAY MKR Switch (29), rotate the MARKER FREQ Control (9) full ccw. Verify that Frequency Counter indicates between 17 and 19 MHz. (No adjustment available).

17 MHz_____19 MHz

IF OSCILLATOR TUNE CIRCUIT ADJUSTMENT

8. Disconnect power from RD-300. Disconnect Frequency Counter and reconnect it to J-54 on IF & Marker Osc. P.C. Board.

9. Connect DVM to (anode) junction of D7 and D8 on AUX. P.C. Board. (RD-300 serial number 213 and up, D4 and D5.)

10. Apply power to RD-300 and rotate coarse MAN FREQ Control (10) to full cw position.

11. Set R-24 on Aux P.C. Board to center position. Adjust R-28 ccw until DVM indication remains constant indicating that X3 has reached saturation. Note voltage. Rotate R-28 cw until DVM indication is reduced by 0.5 V indicating that X3 is just out of saturation.

_____ Volts

12. Adjust L-1 on IF & Marker Osc. P.C. Board to obtain approximately 71.5 MHz (71 to 72 MHz) on Frequency Counter.

71 MHz_____72 MHz

6-14. IF AND MARKER OSCILLATORS CALIBRATION (cont'd)

13. Rotate coarse MAN FREQ Control (10) to full ccw position.

14. Adjust R-24 on AUX. P.C. Board to obtain approximately 18.5 MHz (18 to 19 MHz) on Frequency Counter. Verify that X-3 is not cut off while adjusting R-24 (DVM should vary with R-24 adjustment).

18 MHz_____19 MHz

15. Because of interaction between R-24 & R-28, repeat Steps 8 through 11 until the frequency span is wide enough to cover the 20 to 70 MHz requirement. This means that the minimum frequency will be about 18.5 MHz (18 to 19 MHz) and the maximum frequency will be about 71.5 MHz (71 to 72 MHz).

Minimum freq. 18 MHz_____19 MHz
Maximum freq. 71 MHz_____72 MHz

16. Disconnect DVM.

MIXER BALANCE ADJUSTMENT

17. Connect Spectrum Analyzer to J-53 on IF & Marker P.C. Board.

18. Set the Analyzer controls for 60 MHz center frequency, 10 MHz/div. span width, 20 dB RF attenuation, and 10 dB/div. log. display.

19. Set MAN FREQ Control (10) to obtain 60 MHz Analyzer Display.

20. Adjust MIXER BALANCE potentiometer (R-24) on IF & Marker Osc. P.C. Board for maximum 60 MHz signal and minimum spurious signal (at approx. 45 MHz).

_____(✓)

MARKER LEVEL CHECK

NOTE

If requirements of Steps 21 and 24 are not met, adjust the value of R-36 on the IF & Marker Osc. P.C. Board.

21. Press DISPLAY MKR Switch (29) and rotate MKR FREQ Control (9) until marker frequency is close to 60 MHz IF carrier on analyzer display. Marker frequency should be less than 35 dB below carrier.

-35 dBc_____

Release DISPLAY MKR Switch (29).

6-14. IF AND MARKER OSCILLATORS CALIBRATION (cont'd)

22. Rotate MAN FREQ Control (10) until Frequency Counter indicates 30 MHz.

23. Set Spectrum Analyzer for 30 MHz.

24. Press DISPLAY MKR Switch (29) and rotate MKR FREQ Control (9) until marker frequency is close to 30 MHz IF carrier on analyzer display. Marker Frequency should be less than 35 dB below carrier.

-35 dBc_____

SWEEP WIDTH ADJUSTMENT

25. Set Spectrum Analyzer to carrier frequency (30 MHz) at 0.5 MHz span width. Set sweep speed to 50 ms/div.

26. Verify that the carrier just starts to sweep when the SWP WIDTH MHz Control (3) dial is just past 0. If necessary, reset the dial. First remove the dial. Then rotate the control shaft until the carrier just begins to sweep. Without rotating the control, replace the dial so the index mark is aligned with 0 and tighten the two set screws.

_____(✓)

27. Set SWP WIDTH MHz Control (3) to 4 MHz.

28. Adjust SWEEP WIDTH Potentiometer (R-7) on Counter Boards for a swept carrier display of 8.0 divisions (4 MHz p-p). Access to R-7 is made through a hole in the top of the counter module.

_____(✓)

29. Set SWP WIDTH MHz Control (3) to 2 MHz. Analyzer should indicate a swept carrier of 4.0 divisions (±10%). If necessary, readjust R-7 until swept carrier at 2 and 4 MHz is within 10% of dial setting.

_____(✓)

6-15. PRESCALER AND COUNTER TEST

DESCRIPTION: This procedure measures the IF frequency with a Frequency Counter at the Front Panel IF Output Connector (26) and then compares it to the RD-300 frequency display to verify correct operation of the prescaler and counter. At the same time, the MAN FREQ (10) and MKR FREQ (9) Controls are checked for correct operation.

6-15. PRESCALER AND COUNTER TEST (cont'd)

REQUIREMENTS: RD-300 IF frequency display should match Frequency Counter indication.

TEST EQUIPMENT: Frequency Counter (Table 6-1)

PROCEDURE:

1. Set controls as follows:

   RF/IF Mode Selectors (25) . . . . . IF HI
   Modulation Mode Selectors (42). . . . . CW
   PRF/RF (11) . . . . . RF

2. Connect Frequency Counter to IF Output Connector (26). Adjust OUTPUT dBm Control (18) for adequate counter indication.

3. RD-300 Digital Display (12) should match Counter Frequency indication.

   _____(✓)

4. Rotate MAN FREQ Controls (10) and verify that the Digital Display (12) indicates increasing frequency with cw rotation and decreasing frequency with ccw rotation.

   _____(✓)

5. While pressing the DISPLAY MKR Switch (29), rotate MKR FREQ Control (9) and verify that RD-300 Digital Display (12) indicates increasing frequency with cw rotation and decreasing frequency with ccw rotation.

   _____(✓)

6-16. IF GENERATOR POWER AMPLIFIER CHECK AND ADJUSTMENT

DESCRIPTION: The leveler system is adjusted on the IF Gen. Power Amplifier to +20 dBm at the Front Panel IF Output Connector (26). Ref. Schematic 3-25-103.

TEST EQUIPMENT: RF Power Meter with 100 mW head. (Table 6-1).

PROCEDURE:

1. Set controls as follows:

   RF/IF Mode Selectors (25) . . . . . HI

   MODULATION Mode Selectors (42). . . . . CW

   OUTPUT dBm Control (18) . . . . . +20 dBm

6-16. IF GENERATOR POWER AMPLIFIER CHECK AND ADJUSTMENT (cont'd)

2. Connect the Power Meter (with 100 mW head) to RD-300 Front Panel IF Output Connector (26).

NOTE

If requirements of Steps 3 and 4 are not met, perform Step 5, otherwise omit Step 5.

3. Using the MAN FREQ Control (10), select 30 MHz. Power Meter should indicate +20 dBm (±2 dB).

+18.0 dBm_____22.0 dBm

4. Using MAN FREQ Control (10), select 60 MHz. Power Meter should indicate +20 dBm (±2 dB).

+18.0 dBm_____22.0 dBm

5. Adjust R-23 (via access hole in power amp. mounting plate) to obtain +20 dBm (±2 dB) at 30 and 60 MHz IF.

6-17. BIAS/TUNE PC BOARD (X-BAND GENERATOR TUNE RANGE)

DESCRIPTION: The manual tuning range of the X-band Signal Generator is verified and adjusted if necessary.

REQUIREMENT: Variable X-band tuning range should be 9295 to 9425 MHz.

TEST EQUIPMENT: None

PROCEDURE:

1. Place PRF/RF Switch (11) to RF. Select RF MAN mode by pressing MAN pushbutton (42).

NOTE

If requirements of Step 2 are not met, perform Steps 3 through 5, otherwise omit Steps 3 through 5.

2. Verify that Digital Display (12) indicates from 9295 MHz, or below, through 9425 MHz, or above, when MAN FREQ Controls (10) are rotated from full ccw positions to full cw positions.

_____≤ 9295 MHz, 9425 MHz ≤_____

6-17 BIAS/TUNE PC BOARD (X-BAND GENERATOR TUNE RANGE) (cont'd)

3. Set the MAN FREQ Controls (10) to full cw positions. Adjust R-12, GAIN, potentiometer until frequency display indicates 9429 (±1) MHz.

9428 MHz_____9430 MHz

4. Set the MAN FREQ Controls (10) to full ccw positions. Adjust R-13, POSITION potentiometer, for half the difference between the frequency indication and 9291 MHz.

5. Repeat Steps 3 and 4 until MAN FREQ range limits are from 9291 (±1) MHz to 9429 (±1) MHz.

9290 MHz_____9292 MHz
9428 MHz_____9430 MHz

6-18. RF LEVELER CIRCUITRY CHECK

NOTE

Perform this procedure only if components have been replaced in the Leveler and/or Range Contour Systems or trouble is suspected in the RF Leveler System.

DESCRIPTION: The L-band power level is checked at the output of the IF/RF Select Relay with an RF Power Meter. Adjustments to power level are made on the Range/ Contour Board and the Aux. Board. Ref. Schematics: Interconnect 4-25-108, Aux. Board 3-25-119, and Range & Contour Board 4-25-100.

REQUIREMENTS: L-Band power level should be constant (±0.5 dB) at J-32 from 9295 MHz to 9425 MHz.

TEST EQUIPMENT: RF Power Meter with 100 mW head.
Digital Voltmeter (DVM) (Table 6-1).

PROCEDURE:

1. Disconnect power from RD-300.

2. Remove top cover, and remove AUX Board from its housing. Place a cardboard sheet under the module, and lay it on the housing. Remove semi-rigid coax from J-32 to J-31.

6-18. RF LEVELER CIRCUITRY CHECK (cont'd)

3. Apply power to RD-300.

4. Set controls as follows:

RF/IF Mode Selectors (25)	RF MAN
OUTPUT dBm Control (18)	-50 dBm
OUTPUT dB Control (13)	0 dB
CONTOUR dB Control (14)	0 dB

CAUTION

Do NOT disconnect power from RD-300 when RF Power Meter is connected to J-32. To do so may severely damage the RF Power Meter Head. Always disconnect RF Power Meter Head from J-32 with RD-300 power ON.

5. Connect RF Power Meter with 100 mW head to Connector J-32 of the IF/RF Relay (J-32 frequency range is 1045 to 1175 MHz).

NOTE

If the requirements of Step 6 are not met, perform Steps 7 through 18, otherwise omit Steps 7 through 18.

6. Using MAN FREQ Controls (10), vary frequency from 9295 to 9425 MHz. Verify Power Meter indicates -2 dBm (±3 dB) at 9375 MHz and does not vary more than ±0.5 dB over tuning range.

Power level : -5 dBm_____+1 dBm
Power level Vs. Freq: (±0.5 dB)_____(✓)

NOTE

If the requirements of Step 7 are not met, circuit maladjustments of malfunctions exist. The remainder of this procedure is intended to aid in correcting either possibility. Otherwise, continue by performing Step 18 of this procedure.

7. Connect DVM to Pin 5 of P-8 on the AUX. Board. Vary the MAN FREQ Controls (10) from 9295 to 9425 MHz. The DVM should indicate a voltage of approximately -1 V dc with Contour set at 10 dB and vary not more than ±0.05 V as frequency is varied from 9295 to 9425 MHz.

_____(✓)

6-18. RF LEVELER CIRCUITRY CHECK (cont'd)

8. Rotate LEVELER ADJ. Potentiometer (R-1) on AUX. Board to full cw stop.

9. Connect DVM to Pin 1 of P-8 on AUX. Board. Adjust CONTOUR dB Control (14) to obtain +3 V or more at P-8, Pin 1.

_____(✓)

10. If a major component in the CONTOUR System has been replaced and the adjustments are known to be far from the correct settings, adjust POSITION (R-36) and SLOPE (R-39) on RANGE/CONTOUR Board C to obtain +3 V at P-8 Pin 1 and -3 V at P-8, Pin 5. (P-8 is on AUX Bd).

_____(✓)

11. Using DVM, verify level control signal at P-8, Pin 4 on AUX Bd. is approximately -0.5 V dc.

_____(✓)

12. Rotate both OUTPUT Controls (13 & 18) to full cw positions, and also verify that RF MAN Mode (42) is selected.

13. Adjust LEVELER ADJ. Potentiometer (R-1) on AUX. Board and CONTOUR dB Control (14) on Front Panel for maximum output indication on RF Power Meter. (This should be approximately +18 dBm if the Contour System is operating and is calibrated. If Contour System has been replaced and calibrated, adjust POSITION (R-36) and SLOPE (R-39) Potentiometers on RANGE/CONTOUR Board for maximum output indication).

_____(✓)

14. Adjust MAN FREQ Controls (10) between 9295 and 9425 MHz as indicated on the Digital Display (12) and stop at the frequency at which the Power Meter indication is lowest.

_____(✓)

15. Adjust LEVELER ADJ Potentiometer (R-1) on AUX. Board to reduce power indication by 0.5 to 1.0 dB.

_____(✓)

16. Connect DVM to Pin 5 of P-8.

6-18. RF LEVELER CIRCUITRY CHECK (cont'd)

17. Rotate MAN FREQ Controls (10) through entire frequency range. Verify that RF Power Meter indication (at J-32) is constant within ±0.5 dB and that negative voltage at P-8, Pin 5 is constant within ±0.05 V dc.

_____(✓)

18. Do not disconnect RF Power Meter and do NOT disconnect power from RD-300. Perform the CONTOUR DIAL CALIBRATION (6-19) Procedure starting with Step 4 and then Steps 6 through 16.

6-19. CONTOUR dB CONTROL DIAL CALIBRATION

DESCRIPTION: The CONTOUR dB Control (14) dial is calibrated using an RF Power Meter connected to an internal signal at J-32, the output of the IF/RF Select Relay. Ref. Schematics: Interconnect 4-25-108, AUX. Board 3-25-119, and Range & Contour Board 4-25-100.

PREREQUISITIES: RF Leveler Circuitry Check (6-18)

REQUIREMENTS:

CONTOUR dB Control (14)	Connector J-32
0 dB	- 2 dBm (±0.2 dB)
5 dB	+ 3 dBm (±0.2 dB)
18 dB	+16 dBm (±0.2 dB)
20 dB	+18 dBm (±0.2 dB)

TEST EQUIPMENT: RF Power Meter with 100 mW head, Digital Voltmeter (DVM) (Table 6-1)

PROCEDURE:

1. Disconnect power from RD-300.

2. Remove top cover, and remove AUX. Board from its housing. Place a cardboard sheet under the module and lay it on the housing. Remove semi-rigid coax from J-32 to J-31.

3. Apply power to RD-300.

6-19. CONTOUR dB CONTROL DIAL CALIBRATION (cont'd)

4. Set controls as follows:

RF/IF Mode Selectors (25) . . . . . RF MAN

OUTPUT dBm Control (18) . . . . . (cw), -50 dBm

OUTPUT dB Control (13). . . . . (cw), 0 dB

CAUTION

Do not disconnect power from RD-300 while RF Power Meter is connected to J-32. To do so may severely damage the RF Power Meter Head. When required, disconnect RF Power Meter Head from J-32 while RD-300 power is ON.

5. Connect RF Power Meter with 100 mW head to Connector J-32.

6. Rotate CONTOUR dB Control (14) to 0. Verify that power just starts to increase as dial is rotated slightly cw of 0. Reset the dial set screw if necessary.

_____(✓)

7. Set CONTOUR dB Control to 20 dB.

8. Adjust POSITION(R-36) and SLOPE (R-39) Potentiometers on RANGE/CONTOUR Board C for Power Meter indication of 18.5 dBm.

_____(✓)

9. Adjust LEVELER ADJ. (R-1) Potentiometer on AUX. Board for Power Meter indication of 18.0 dBm.

_____(✓)

10. Set CONTOUR dB Control to ccw stop (0 or below).

11. Adjust OFFSET (R-8) Potentionmeter on AUX. Board for Power Meter indication of -2 dBm.

_____(✓)

12. Set CONTOUR dB Control to 5 dB.

13. Adjust POSITION (R-36) Potentiometer on RANGE/CONTOUR Board C for Power Meter indication of +3 dBm.

_____(✓)

6-19. CONTOUR dB CONTROL DIAL CALIBRATION (cont'd)

14. Set CONTOUR dB Control (14) to 18 dB.

15. Adjust SLOPE (R-39) Potentiometer on RANGE/CONTOUR Board C for Power Meter indication of +16 dBm.

_____(✓)

16. Repeat Steps 9 through 15 as often as necessary to obtain the most accurate calibration. Acceptable tolerance is ±0.2 dB, but careful adjustments will usually result in more precise results.

CAUTION

Disconnect RF Power Meter 100 mW head from J-32 BEFORE disconnecting power from RD-300.

6-20. LOCAL OSCILLATOR LEAK-THROUGH CHECK.

DESCRIPTION: This procedure intends to verify that Local Oscillator (8.25 GHz) leak-through is at a minimum so that erroneous RF Power Meter indications are eliminated in the RF Output (31) and AUX OUT (23) Connector Output Level Adjustments Procedure (6-21). The 8.25 GHz Oscillator leak-through does not affect normal operation with a Radar R/T Unit under test).

REQUIREMENTS: 8.25 GHz leak-through should be -38 dBm, or less, at RF Output (31) and AUX OUT (23) Connectors.

TEST EQUIPMENT: RF Power Meter

High Pass Filter, if required for Step 5 (Table 6-1)

PROCEDURE:

1. Set controls as follows:

Modulation Mode Selectors (42) . . . . . EXT (+) or (-)

RF/IF Mode Selector (25) . . . . . MAN

OUTPUT (18). . . . . -120 dBm

6-20. LOCAL OSCILLATOR LEAK-THROUGH CHECK (cont'd)

2. Connect RF Power Meter to RF Output Connector (31). Power Meter should indicate -38 dBm or less.

_____-38 dBm

3. Set RF/IF Mode Selector (25) to AUX.

4. Disconnect RF Power Meter from RF Output Connector (31), and connect it to the AUX OUT Connector (22). Power Meter should indicate -38 dBm or less.

6-20. LOCAL OSCILLATOR LEAK-THROUGH CHECK (cont'd)

5. If results of Steps 2 through 4 indicate levels above -38 dBm, a High Pass Filter (Addington Laboratories, Sunnyvale, Calif., Model 103800239 or equivalent) is necessary to suppress the 8.25 GHz Local Oscillator energy when making RF Output (31) and AUX OUT Connector (22) power measurements in Paragraph 6-21.

6-21. RF OUTPUT AND AUX OUT CONNECTOR OUTPUT LEVEL ADJUSTMENT

DESCRIPTION: The RF output level at the RF Output Connector (31) (with calibrated cable) and at the AUX OUT Connector (22) is adjusted using an RF Power Meter, connected to the appropriate Front Panel Connectors, as referenced. Both adjustments are made on the Auxiliary Board. Ref. Schematic: Aux. Board 3-25-119.

PREREQUISITE: CONTOUR dB CONTROL DIAL CALIBRATION (6-19), LOCAL OSCILLATOR LEAK-THROUGH CHECK (6-20)

REQUIREMENTS: ±2 dB Maximum variation from -30 dBm between 9295 MHz and 9425 MHz.

TEST EQUIPMENT: RF Power Meter
High Pass Filter, if required per Paragraph 6-20 (Table 6-1)

PROCEDURE:

1. Disconnect power from RD-300.

2. Remove top cover, and remove AUX board from its housing. Place a cardboard sheet under the module, and lay it on the housing.

3. Apply power to RD-300.

NOTE

If High Pass Filter is used, determine filter loss in dB to be used as a correction factor when power measurements are made.

Filter Loss _____dB

RF OUTPUT CONNECTOR OUTPUT LEVEL (with cable) ADJUSTMENT

4. Connect the Test Set Serialized Coaxial Cable to RF Output Connector (31).

6-21. RF OUTPUT AND AUX OUT CONNECTOR OUTPUT LEVEL ADJUSTMENT (cont'd)

5. Set controls as follows:

MODULATION Mode Selectors (42)	CW
RF/IF Mode Selectors (25)	RF MAN
OUTPUT (18) and (13)	-50 dBm
CONTOUR (14)	OFF
PRF/RF (11)	RF

6. Connect free end of Serialized Coaxial Cable to RF Power Meter (and High Pass Filter, if necessary).

NOTE

If requirements of Step 7 are not met, perform Steps 8 through 10. Otherwise, omit Step 8.

7. Using MAN FREQ Controls (10) vary frequency and record Power Meter readings to plot a graph (Figure 6-2) of Power Meter readings versus frequency. Power Meter should read -30 (±2) dBm. Carefully plot all peaks and valleys in the signal level.

NOTE

Since the -20 dB waveguide Directional Coupler is not used, there will be a 20 dB difference between the attenuator settings and the actual power measured.

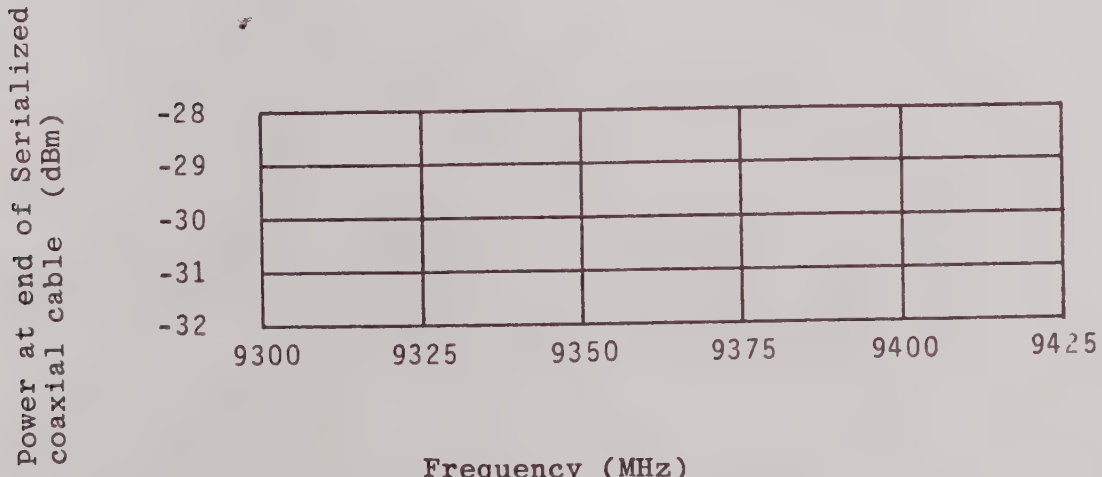


Figure 6-2. RF Output Frequency Sensitivity Graph

6-21. RF OUTPUT AND AUX OUT CONNECTOR OUTPUT LEVEL ADJUSTMENT (cont'd)

8. Adjust RF LEVEL (R-46) (R-56 on sets ser. no. 213 and up) Potentiometer on AUX. Board until Power Meter indicates an equal level above and below -30 dBm as MAN FREQ Controls (10) are varied from 9295 MHz to 9425 MHz.

9. Record final Power Meter versus Frequency Data on RF Output Frequency Sensitivity Graph on Calibration Data Sheet.

10. For future reference note frequency at which Power Meter indicates exactly -30 dBm.

_____MHz

AUX OUT CONNECTOR OUTPUT LEVEL ADJUSTMENT

11. Disconnect the RF Power Meter and the Serialized Coaxial Cable from the RF Output Connector (31). Connect the Power Meter (and High Pass filter, if necessary) to the AUX. OUT Connector (22).

12. Set controls as follows:

MODULATION Mode Selectors (42)	CW
RF/IF Mode Selectors (25).	RF AUX
OUTPUT (18) and (13).	-30 dBm
CONTOUR (14)	OFF
PRF/RF (11).	RF

NOTE

If requirements of Step 13 are not met, perform Steps 14 through 16. Otherwise, omit Step 14.

13. Using MAN FREQ Controls (10), vary frequency and record Power Meter readings to plot a graph (Figure 6-3) of Power Meter readings versus frequency. Power Meter should read -30 (±3) dBm. Care should be taken to plot all peaks and valleys in the signal level.

6-21. RF OUTPUT AND AUX OUT CONNECTOR OUTPUT LEVEL ADJUSTMENT (cont'd)

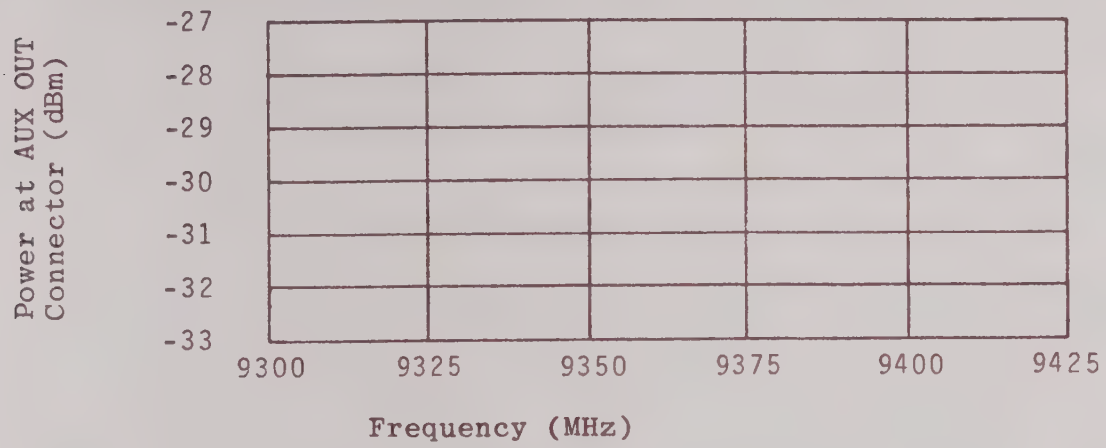


Figure 6-3. AUX OUT Connector Output Frequency Sensitivity Graph.

14. Adjust AUX LEVEL (R-42) (R-52 on sets ser. no. 213 and up) Potentiometer on AUX. Board until Power Meter indicates an equal level above and below -30 dBm as MAN FREQ Controls (10) are varied from 9295 MHz to 9425 MHz.

15. Record final Power Meter versus Frequency Data on AUX OUT Frequency Sensitivity Graph on Calibration Data Sheet.

16. For future reference, note frequency at which Power Meter indicates exactly -30 dBm.

_____MHz

6-22. PRF Hz CONTROL AND WIDTH µS CONTROL DIAL CALIBRATIONS

DESCRIPTION: The PRF Hz Control (44) dial is calibrated using the Test Set Digital Display (12). The WIDTH µs Control (43) dial is calibrated using a Crystal Detector at the AUX OUT Connector (22) and an Oscilloscope. Ref. Schematic: 4-25-0100.

TEST EQUIPMENT: Oscilloscope
Crystal Detector
-12 V dc Power Supply
100 K ohm, ½ W, 10% Resistor (Table 6-1)

6-22. PRF Hz CONTROL AND WIDTH µS CONTROL DIAL CALIBRATIONS (cont'd)

REQUIREMENTS: PRF, ±5 Hz at 50 Hz
±50 Hz at 500 Hz
Pulse Width, ±0.4 µs at 2 µs

PROCEDURE:

PRF Hz CONTROL DIAL CALIBRATION

1. Set controls as follows:

MODULATION Mode Selector (42). . . . . INT

PRF/RF Selector (11) . . . . . PRF

2. Rotate PRF Hz Control (44) to ccw stop and verify that dial is aligned to 50. If necessary, loosen set screws and reset dial.

_____(✓)

3. With the PRF Hz Control (44) at 50, verify that Digital Display (12) indicates 50 (±5) Hz. If necessary, adjust 50 Hz ADJ. (R-7) Potentiometer on Range/Contour Board C until Digital Display (12) indicates 50 (±5) Hz.

45 Hz_____55 Hz

4. Rotate the PRF Hz Control (44) to 500, and verify that Digital Display (12) indicates 500 (±50) Hz. If necessary, adjust 500 Hz ADJ. (R-20) Potentiometer on Range/Contour Board C until Digital Display (12) indicates 500 (±50) Hz.

450 Hz_____550 Hz

WIDTH µs CONTROL DIAL CALIBRATION

5. Set controls as follows:

MODULATION Mode Selector (42) . . . . . INT

RF/IF Mode Selector (25). . . . . RF AUX

Range (1) 001

µs/NM Selector. . . . . µs
[µs/MILE. . . . . µs][1]

OUTPUT (18) . . . . . -20 dBm

CONTOUR (14). . . . . OFF

RANGE RING (2). 1

[1]Units prior to S/N 109

6-22. PRF Hz CONTROL AND WIDTH µS CONTROL DIAL CALIBRATIONS (cont'd)

6. Connect Crystal Detector to AUX OUT Connector (22).

7. Connect Oscilloscope to Crystal Detector. Bias detector output at Oscilloscope with -12 Volts dc power source through the 100 K Ohm Resistor.

8. Trigger Oscilloscope from DLYD SYNC Connector (39), and set vertical sensitivity at 5 mV/div.

9. Rotate WIDTH µs Control (43) fully ccw to 2 µs, and then rotate it slightly cw until the pulse on the Oscilloscope Display just starts to widen. At this point, the WIDTH µs Control (43) dial should indicate 2 µs. Loosen screws, and reset the WIDTH µs Control (43) dial, if necessary.

_____(✓)

10. With the WIDTH µs Control (43) set to 2 µs, the Oscilloscope Display should indicate pulse width, at 50% amplitude, of 2 µs (±0.4 µs). If necessary, adjust 2 µs ADJ (R-23) on Range and Contour Bd. B Potentiometer for 2 (±0.4) µs pulse width.

1.6 µs_____2.4 µs

6-23A. 30 MHz PULSE DISCRIMINATOR (For Sets Prior to S/N 109)

DESCRIPTION: The Test Set IF Signal Generator is used to generate an input signal for preliminary calibration of the Discriminator Module. Final calibration is performed in Paragraph 6-25A, Ref. Schematic: 3-25-101.

REQUIREMENTS: 0.1 (±0.01) Volts/MHz

TEST EQUIPMENT: Oscilloscope, Coaxial Tee, Flexible Coaxial Cable.

PROCEDURE:

1. Disconnect power from RD-300.

2. Disconnect coaxial cables from J-56, 57, 58 and 59.

3. Remove 30 MHz Pulse Discriminator Module, and then remove cover. Place module on cardboard for insulation, and then apply power to RD-300.

4. Using flexible coaxial cable, connect Front Panel IF Out-Put Connector (26) to J-56 on Discriminator Module.

6-23A. 30 MHz PULSE DISCRIMINATOR (cont'd)

5. Set controls as follows:

RF/IF Mode Selectors (25)	IF HI
MODULATION Mode Selectors (42)	INT
PRF/RF Selector (11)	RF
PRF Hz Control (44)	500 Hz
MAN FREQ Controls (10)	30 MHz
WIDTH µs Control (43)	3 µs
OUTPUT (13 & 18)	30 dBm

6. Connect Oscilloscope to Pin 7 of X1.

7. Adjust 30 MHz GAIN (R-6) Potentiometer to obtain saturation at X1, Pin 7.

8. Set ZERO Control (R-9) on Front Panel to center on mechanical range.

9. Disconnect Oscilloscope and connect it to cathode of CR-3. (Junction of CR-3 & R-18).

10. Adjust coil L-3 for maximum dc level on Oscilloscope.

_____(✓)

11. Disconnect Oscilloscope and connect it to junction of R-18 and R-19.

12. Adjust coil L-4 for Null (6 Volts dc).

_____(✓)

13. Using a Coaxial Tee Connector and Flexible Coaxial Cable, connect DLYD SYNC Connector (39) on RD-300 Front Panel to J-57 on 30 Hz Pulse Discriminator Module and to Oscilloscope External Trigger Input.

14. Adjust THRESHOLD ADJUST (R-42) Potentiometer until TRACK Indicator (28) LED just comes ON.

_____(✓)

15. Disconnect Oscilloscope and connect it to junction of C-27 and R-55.

6-23A. 30 MHz PULSE DISCRIMINATOR (cont'd)

16. Adjust INTEGRATOR OFFSET (R-31) Potentiometer to stop sweep (vertical movement) on Oscilloscope.

_____(✓)

17. Disconnect Oscilloscope, and connect it to J-58 on the 30 Hz Pulse Discriminator Module. Terminate Oscilloscope Input with 50 Ohm Load.

18. Set Baseline Clipper Front Panel screwdriver adjustment (R-9) to center of mechanical range.

19. Verify Oscilloscope Display is a positive pulse 3 µs wide.

_____(✓)

NOTE

The amplitude of the displayed pulse will vary inversely with frequency. After calibration, amplitude should be ~0.1 Volt per MHz.

20. Note and record pulse amplitude above base line.

_____Volts

21. Adjust MAN FREQ Controls (10) for 29.50 MHz Digital Display (12). Note and record pulse amplitude above base line.

_____Volts

22. Adjust DISC CAL (R-73) Potentiometer for a pulse amplitude 0.05 Volts greater than value recorded in Step 20.

23. Adjust MAN FREQ Controls (10) for 30.00 MHz Digital Display (12).

24. Adjust BASELINE CLIPPER LIMIT (R-81) Potentiometer to reduce the amplitude of the pulse to between 0.05 and 0.1 Volts. (It may be necessary to adjust R-81 to mechanical center and then set Front Panel Baseline Clipper screwdriver adjustment (R-9) to obtain the required range for R-81). Note and record pulse amplitude above base line after adjustment.

0.05 V_____0.1 V

6-23A. 30 MHz PULSE DISCRIMINATOR (cont'd)

25. Adjust MAN FREQ Controls (10) for 29.50 MHz Digital Display (12).

26. Adjust DISC CAL (R-73) Potentiometer for a pulse amplitude 0.05 Volts greater than value recorded in Step 24.

27. Adjust MAN FREQ Controls (10) for 30.00 MHz Digital Display (12). Note and record pulse amplitude above base line.

_____Volts

28. Adjust MAN FREQ Controls (10) to 30.50 MHz. Verify that pulse amplitude above base line is 0.05 Volts below level recorded in Step 27. Record pulse voltage level.

_____Volts

29. Repeat Steps 19 through 28 until pulse amplitude difference between 29.50 and 30.50 MHz is 0.1 (±0.01) Volts and linear. Record final data below.

A) Pulse level at 29.50 MHz _____V
B) Pulse level at 30.00 MHz _____V
C) Difference Voltage at -0.5 MHz _____V
D) Pulse level at 30.50 MHz _____V
E) Difference Voltage at +0.5 MHz _____V
F) Difference Voltage between -0.5 & +0.5 MHz

0.09 V_____0.11 V

6-23B. 30 MHz PULSE DISCRIMINATOR AND PANEL (ΔF) METER CALIBRATION (For Sets S/N 109 & on)

DESCRIPTION: Preliminary calibration of the 30 MHz Pulse Discriminator and of the ΔF scale of the Panel Meter (8) is performed using the Test Set IF Signal Generator for an input signal. Final calibration of this system is performed in Paragraph 6-25B. Ref. Schematic 4-25-124.

TEST EQUIPMENT: Oscilloscope

6-23B. 30 MHZ PULSE DISCRIMINATOR AND PANEL (ΔF) METER CALIBRATION (cont'd)

PROCEDURE:

DISCRIMINATOR CIRCUIT

1. Disconnect power from RD-300.

2. Disconnect coaxial cables from J56 and 57.

3. Remove top screws, and remove Discriminator Module from its housing. Remove Board B from Cover Plate. Place both boards on cardboard for insulation and then on the housing.

4. Using Flexible Coaxial Cable, connect Front Panel IF Output Connector (26) to J-56 on Discriminator Module. Connect DLYD SYNC Connector (39) to J-57.

5. Set controls as follows:

RF/IF Mode Selectors (25)	IF LO
MODULATION Mode Selectors (42)	INT
PRF/RF (11)	RF
PRF Hz Control (44)	500 Hz
MAN FREQ Controls (10)	30 MHz
WIDTH μs Control (43)	3 μs
OUTPUT Control (18)	-30 dBm

6. Set Oscilloscope controls for 50 mV/div., ac coupling, and 2 μs/div. Trigger the Oscilloscope from the RD-300 DLYD SYNC Connector (39).

7. Connect Oscilloscope to Pin 15 of X1 on Board A.

8. Adjust 30 MHz GAIN (R-7) Potentiometer until the 1 Volt peak to peak signal at X1, Pin 15 is fully limited with OUTPUT Controls (13 & 18) set to -34 dBm.

_____(✓)

9. Set OUTPUT (18) to -30 dBm.

10. Disconnect Oscilloscope, and connect it to TP-1 on Board A.

6-23B. 30 MHz PULSE DISCRIMINATOR AND PANEL (ΔF) METER CALIBRATION (cont'd)

11. Adjust coil L-2 for peak signal (approximately 100 mV peak to peak at 30.0 (±0.1) MHz.

_____(✓)

12. Disconnect Oscilloscope, and connect it to TP-2 on Board A.

13. Adjust CARRIER BAL. (R-36) Potentiometer for minimum 30 MHz feedthrough. Maximum 30 MHz feedthrough should not be more than 20 mV peak to peak.

_____20 mV peak to peak

14. Adjust Coil L-3 so that the pulse at TP-2 is "zeroed" (pulse is level with base line) when the input frequency is 30.00 MHz.

_____(✓)

15. Set MAN FREQ Controls (10) for 30.00 MHz Digital Display (12).

16. Set Oscilloscope for ac coupling.

17. Disconnect Oscilloscope, and connect it to TP-3 on Board A.

18. Adjust coil L-4 for maximum negative pulse signal.

6-23B. 30 MHz PULSE DISCRIMINATOR AND PANEL (ΔF) METER CALIBRATION (cont'd)

PANEL (ΔF) METER CALIBRATION

19. Connect Oscilloscope to DISC OUT Connector (20). Terminate in 50Ω. Vary MAN FREQ Controls (10) for maximum positive and negative pulse amplitudes on Oscilloscope. Maximum positive and negative amplitudes should be approximately equal. If not, adjust L-2 on Board A until positive and negative pulse amplitudes are approximately equal.

_____(✓)

20. Set MAN FREQ Controls (10) for 30.50 MHz Digital Display (12).

21. Adjust DISC CAL (R-23) Potentiometer on Board B until the DISC OUT pulse is 50 mV peak.

_____(✓)

22. Place PWR/ΔF Control (7) to ΔF position.

23. Set MAN FREQ Controls (10) for 30.00 MHz Digital Display (12). With Oscilloscope, verify that the discriminator pulse at TP-2 is zeroed.

24. Adjust ΔF ZERO (R-44) Potentiometer on Board B until Panel Meter (8) ΔF scale indication is zero.

_____(✓)

25. Set MAN FREQ Controls (10) for 30.5 MHz.

26. Adjust ΔF CAL (R-41) Potentiometer on Board B until Panel Meter (8) ΔF indication is +0.50 (±0.05) MHz.

+0.45 MHz_____+0.55 MHz

6-23B. 30 MHz PULSE DISCRIMINATOR AND PANEL (ΔF) METER CALIBRATION (cont'd)

27. Set MAN FREQ Controls (10) for 92.5 MHz.

28. Adjust coil L-2 on Board B SLIGHTLY until Panel Meter (8) ΔF scale indicates -0.50 (±0.05) MHz.

-0.55 MHz_____-0.45 MHz

29. Repeat Steps 23 through 28 until Panel Meter (8) ΔF scale indicates correctly. If problems arise with coil L-2 adjustment, repeat Steps 5 through 11.

6-24. SINGLE SIDEBAND TUNING

DESCRIPTION: A Spectrum Analyzer is used to adjust the two offset Oscillators. An L-Band Signal Generator is used to simulate a radar return for final tuning. Ref. Schematic: 3-25-120.

NOTE

This procedure should be performed only if the Information or Calibration Signals are not at nominal -30 dBm levels or if a malfunction in the system has been corrected.

TEST EQUIPMENT: Spectrum Analyzer, L-Band Signal Generator, 1K Ohm ¼W 10% Resistor, Oscilloscope, VSWR Bridge, Insulated Screwdriver or Metal Tipped Tuning Tool (Table 6-1)

PROCEDURE:

275 MHz OSCILLATOR TUNING

1. Disconnect the semi-rigid coaxial cable from J-60 on Single Sideband (SSB) Module. (See Figure 6-4).

2. Connect spectrum analyzer to SSB module J-60.

3. Tune Analyzer to 275 MHz center frequency, and set scan width to 10 MHz per division.

4. If a 275 MHz signal (-30 dBm nominal) does not appear on the Spectrum Analyzer, tune Coil L-1 until the Oscillator "pops" on. Leave Coil L-1 at the middle of its tuning range. Verify that the Oscillator starts reliably by cycling the power ON and OFF with the LINE Switch (41).

_____(✓)

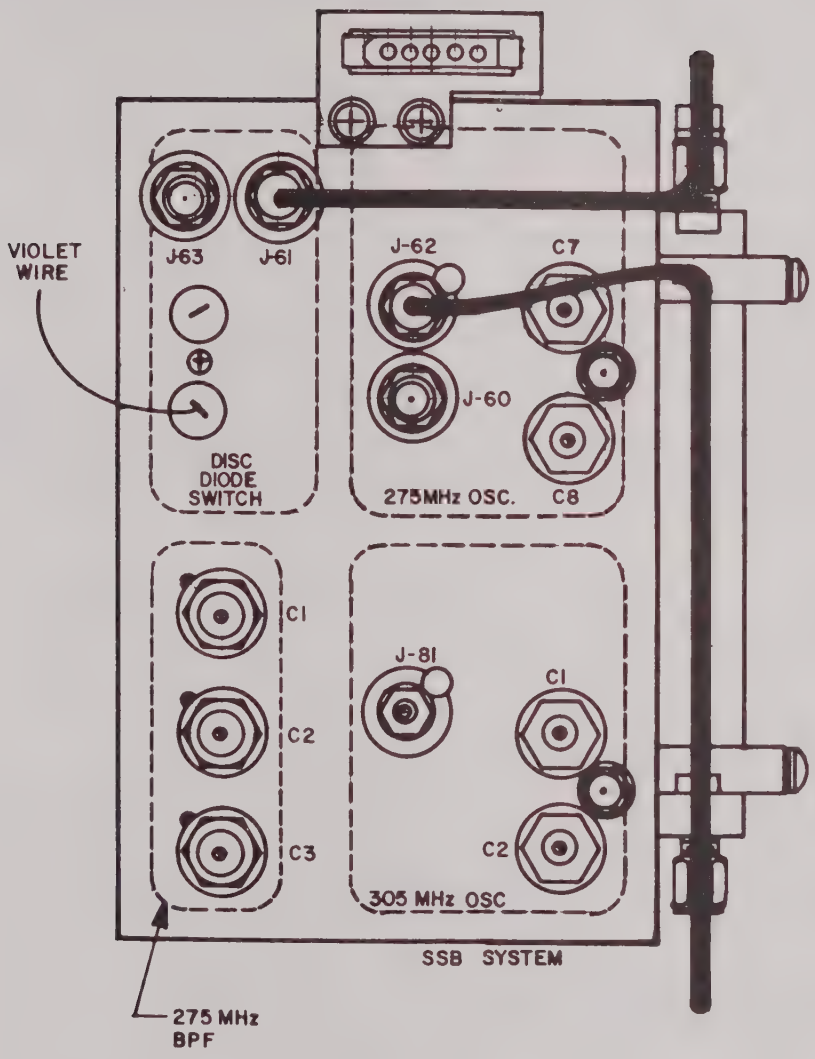


FIG. 6-4 SSB MODULE CONNECTOR IDENTIFICATION

6-24 SINGLE SIDEBAND TUNING (cont'd)

5. Adjust C-7 and C-8 for maximum 275 MHz signal. Disconnect Spectrum Analyzer, and restore the semi-rigid coaxial cable connector to J-60.

_____(✓)

305 MHz OSCILLATOR TUNING

6. Disconnect the semi-rigid coaxial cable from J-81 on SSB Module.

7. Connect Spectrum Analyzer to SSB Module J-81.

8. Tune Spectrum Analyzer to 305 MHz center frequency, and set scan width to 10 MHz per division.

9. If a 305 MHz signal (-30 dBm nominal) does not appear, tune Coil L-1 until the Oscillator "pops" on. Leave Coil L-1 at the middle of its tuning range. Verify that the Oscillator starts reliably by cycling the power ON and OFF with the LINE Switch (41).

_____(✓)

10. Adjust C-7 and C-8 for maximum 305 MHz signal. Disconnect Spectrum Analyzer, and restore the coaxial cable connector to J-81.

_____(✓)

X1 (DISCRIMINATOR DIODE SWITCH) VSWR TUNING

11. Disconnect the semi-rigid coaxial cable from J-63 on the SSB module.

12. Connect the VSWR Bridge to J-63. Connect the L-Band Signal Generator to the VSWR Bridge RF Input. Connect the VSWR Bridge Detector Output to the Oscilloscope.

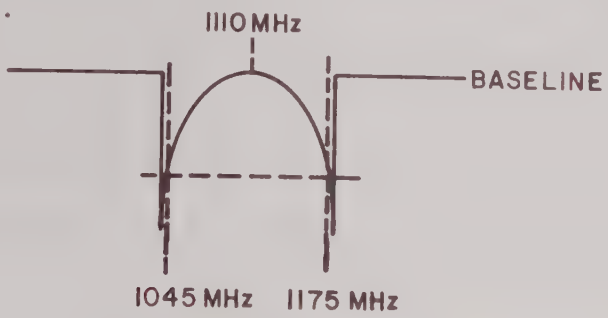
13. Set Signal Generator to LINE rate and center the 100 MHz sweep rate at 1110 MHz.

NOTE

If requirements of Step 14 are not met, perform Steps 15 through 19. Otherwise, omit Steps 15 through 19.

6-24. SINGLE SIDEBAND TUNING (cont'd)

14. Verify that VSWR vs. Frequency curve is at a minimum at approximately 1110 MHz and at an equal value at 1045 and 1175 MHz.



15. Disconnect power from RD-300, and remove bottom cover of Test Set.

16. Remove four screws holding SSB Standoffs to Floor Assembly, and remove SSB from set.

17. Remove SSB bottom cover.

18. Apply power to RD-300.

19. Adjust the gold Trimmer Capacitor on SSB Diode Switch Board with an insulated screwdriver or metal tipped tuning tool to obtain requirements of Step 14.

_____(✓)

275 MHz BANDPASS FILTER (BPF) TUNING.

20. Disconnect power from RD-300. Disconnect VSWR Bridge and reinstall SSB Module.

21. Unsolder violet colored wire from Feedthrough Capacitor C-3 on the Discriminator Diode Switch Section of the SSB Module. Insulate this wire from Chassis Ground.

22. Connect one end of the 1K Ohm ¼W 10% Resistor to C-3 and the other end to -12 V dc (any of the solid yellow wires connected to Feedthrough Filters on Test Set Modules).

23. Disconnect coaxial cable from J-81 on SSB Module.

24. Connect the Analyzer to J-81, and tune the Analyzer for 30 MHz

25. Apply power to the RD-300.

6-24. SINGLE SIDEBAND TUNING (cont'd)

26. Adjust C-1, C-2, and C-3 on the 275 MHz BPF for maximum 30 MHz "Calibration" signal on the Spectrum Analyzer (-30 dBm nominal). Adjust C-7 and C-8 on the 275 MHz Oscillator slightly and C-7 and C-8 on the 305 MHz Oscillator slightly to peak the 30 MHz signal.

_____(✓)

27. Disconnect coaxial cable from J-63 on SSB Module.

28. Connect Spectrum Analyzer to J-63, and tune Analyzer to 1095 MHz. Tune MAN FREQ (10) to 9345.00 MHz.

NOTE

If requirements of Step 29 are not met, perform Step 30. Otherwise, Omit Step 30.

29. Verify that the VCO leak-through (1095 MHz at J-63) is -85 dBm or lower (Bottom cover of SSB Module must be installed for this check).

(1095 MHz at J-63) _____-85 dBm

30. After removing SSB Module from test set, remove bottom cover of SSB Module, and inspect for the following as a cause for excessive VCO leak-through:

A. Top cover is not tight; screws are loose or missing.

B. Excessive lead length from CR-1 to C-9 in the 275 MHz Oscillator Module.

C. Excessive lead length from C-2 to input of 275 MHz BPF in the Discriminator Diode Switch Module.

D. Poor isolation of CR-1 in 275 MHz Oscillator or CR-1 in Discriminator Diode Switch Module.

31. Disconnect power from RD-300.

32. Remove 1K Ohm Resistor from -12 V dc and connect it to +12 V dc (any of the solid red wires connected to Feed-through Filters on Test Set Modules).

NOTE

If requirements of Step 33 are not met, perform Step 34. Otherwise, omit Step 34.

6-24. SINGLE SIDEBAND TUNING (cont'd)

33. Verify that the VCO leak-through (1095 MHz at J-63) is -85 dBm or lower. (Bottom cover of SSB Module must be installed for this check).

(1095 MHz at J-63) _____ -85 dBm

34. After removing SSB Module from Test Set, remove bottom cover of SSB Module and inspect for the following as a possible cause for excessive VCO leak-through:

A. Top cover is not tight; screws are loose or missing.

B. Excessive lead length from CR-1 to C-9 in the 275 MHz Oscillator Module.

C. Excessive lead length from C-2 to input of 275 MHz BPF is the Discriminator Diode Switch Module.

D. Poor isolation of CR-1 in 275 MHz Oscillator or CR-1 in Discriminator Diode Switch Module.

35. Connect the Spectrum Analyzer to J-81 on SSB Module.

36. Tune Spectrum Analyzer to 30 MHz.

37. Connect L-Band Signal Generator to J-63 on SSB Module.

38. Set L-Band Signal Generator controls for -7 dBm at 1095 MHz.

39. Verify that the 30 MHz Information Signal is -30 dBm (+2, -3 dBm).

-33 dBm _____ -28 dBm

40. Disconnect power from RD-300. Remove Resistor and other test equipment. Restore violet wire to C-3 on the Discriminator Diode Switch Module.

6-25A. FINAL 30 MHz DISCRIMINATOR CALIBRATION (For Sets prior to S/N 109)

DESCRIPTION: This procedure checks the accuracy of the 30 MHz Discriminator using an L-Band Signal Generator, a Pulse Generator, a Spectrum Analyzer, and an Oscilloscope. Ref. Schematic: 3-25-101.

REQUIREMENT: 0.1 (±0.01) Volts/MHz

TEST EQUIPMENT: Oscilloscope, L-Band Signal Generator, Pulse Generator, Spectrum Analyzer, 50 Ohm Load, and 20 dB Coaxial Attenator (Table 6-1).

PROCEDURE:

1. Disconnect power from RD-300.

2. Disconnect coaxial cable from J-57.

3. Remove 30 MHz Pulse Discriminator Module from Test Set, and then remove module cover. Place the module on cardboard for insulation.

4. Connect Oscilloscope, L-Band Signal Generator, Pulse Generator, Spectrum Analyzer, and 20 dB Coaxial Attenuator per Fig. 6-5.

5. Set RD-300 controls as follows:

   RF/IF Mode Selectors (25) . . . . . RF TRACK

   MODULATION Mode Selectors (42). . . . . CW

   CONTOUR (14). . . . . OFF

   OUTPUT Controls (13 & 18) . . . . . -100 dBm

6. Set Signal Generator controls as follows:

   FREQUENCY . . . . . 1095.00 MHz (phase-locked)

   OUTPUT LEVEL. . . . . -5 dBm

   MODULATION Mode . . . . . PULSE

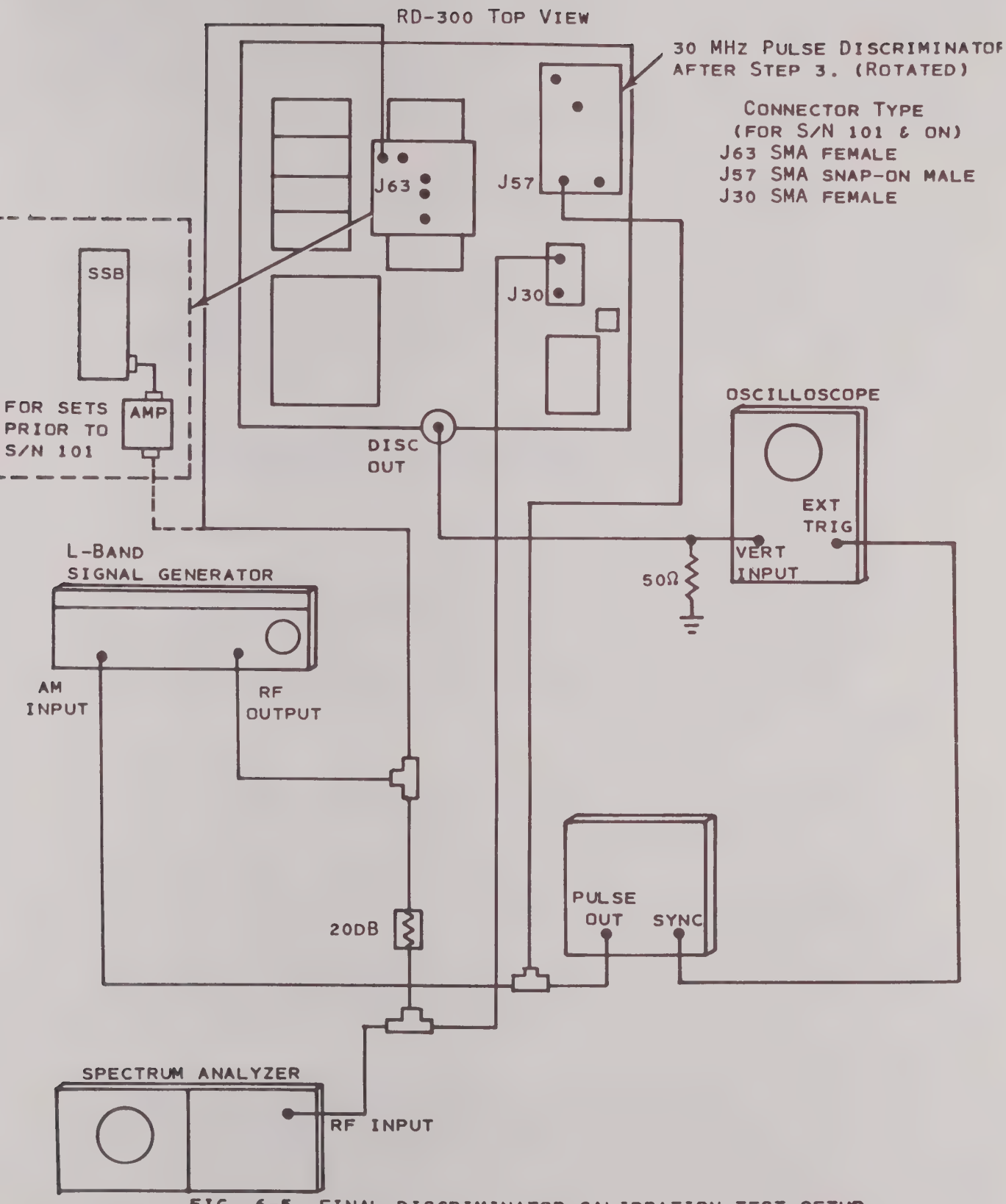


FIG. 6-5 FINAL DISCRIMINATOR CALIBRATION TEST SETUP

6-25A. FINAL 30 MHz DISCRIMINATOR CALIBRATION (cont'd)

7. Set Pulse Generator controls as follows:

PULSE REPETITION FREQUENCY	500 Hz
PULSE WIDTH.	.5 µs
PULSE AMPLITUDE.	2 V p-p, -1 V baseline (into 50 Ω input impedance of AM INPUT of Signal Generator).

8. Connect RD-300 Front Panel DISC OUT Connector (20) (J-58) to Oscilloscope. Terminate Oscilloscope input with 50 Ohm Load. Set Oscilloscope for 20 mV/Division and 10 µs/division.

9. Apply power to RD-300; TRACK Indicator (28) should come ON.

10. Note Front Panel Meter (54) indication, and then press RD-300 TEST (53) pushbutton. While pushbutton is pressed adjust ZERO Control (52) to match indication when TEST (53) is not pushed. Release TEST Switch (53) pushbutton. There should be no difference in Panel Meter (54) indication when TEST Switch (53) is pressed. Digital Display (12) should now indicate 9345.00 MHz.

_____(✓)

NOTE

If requirements of Step 11 are not met, perform Step 12. Otherwise omit Step 12.

11. Select MAN (42), adjust MAN FREQ (10) from 9295 to 9425 MHz, and verify that TRACK Indicator (28) comes ON only at 9345.00 MHz. _____(✓)

12. Adjust MAN FREQ (10) to 9345.50 MHz. Adjust THRESHOLD ADJ. (R-42) on 30 MHz Pulse Discriminator PC Board until TRACK Indicator (28) just comes ON. Repeat Step 11.

_____(✓)

13. Select TRACK Mode (42). Test Set should lock on within 5 to 10 seconds. Note Panel Meter (54) indication; press TEST (53) pushbutton and match noted indication by adjusting ZERO Control (52) Digital Display (12) should indicate 9345.00 MHz.

_____(✓)

6-25A. FINAL 30 MHZ DISCRIMINATOR CALIBRATION (cont'd)

NOTE

If requirements of Step 14 are not met, perform Steps 15 through 23. Otherwise, omit steps 15 through 23.

14. Note amplitude, in volts, of discriminator pulse on Oscilloscope. Using ZERO Control (52) on Front Panel, vary displayed frequency plus and minus 0.50 MHz from 9345.00 MHz. Discriminator pulse should decrease in amplitude at +0.50 MHz and increase by 0.1 (±0.01) V when reaching -0.50 MHz.

1 MHz change = 0.09 V_____0.11 V

15. Set Digital Display (22) to 9345.00 MHz using ZERO Control (52). Note and record discriminator pulse amplitude above base line on Oscilloscope.

_____Volts

NOTE

Make following adjustments with case. Generally, only small adjustments are necessary to obtain the desired results.

16. Adjust ZERO Control (52) for 9344.50 MHz Digital Display. Note and record pulse amplitude above base line.

_____Volts

17. If necessary, adjust DISC CAL (R-73) Potentiometer for a pulse amplitude 0.05 Volts greater than value recorded in Step 15.

18. Adjust ZERO Control (52) for 9345.00 MHz Digital Display (12).

19. If necessary, adjust BASELINE CLIPPER LIMIT (R-81) Potentiometer until pulse amplitude is between 0.05 and 0.1 volts above the baseline. (See Step 24 of Paragraph 6-23A for reference). Note and record pulse amplitude above base line.

0.05 V_____0.1 V

20. Adjust ZERO Control (52) for 9344.5 MHz Digital Display (12).

21. If necessary, adjust DISC CAL (R-73) potentiometer for a pulse amplitude 0.05 Volts greater than value recorded in Step 19.

6-25A. FINAL 30 MHz DISCRIMINATOR CALIBRATION (cont'd)

22. If necessary, adjust ZERO control (52) for 9345.00 MHz Digital Display (12). Note and record pulse amplitude above base line.

_____Volts

23. Adjust ZERO control (52) for 9345.5 MHz Digital Display (12). Verify that pulse amplitude above base line is 0.05 Volts below level recorded in step 22. Record pulse voltage level.

_____Volts

24. Repeat Steps 15 through 23 until pulse amplitude difference between 9344.5 and 9345.5 MHz is 0.1 (±0.01) Volts and linear. Record final data below.

A) Pulse level at 9345.0 MHz _____V
B) Pulse level at 9345.5 MHz _____V
C) Difference voltage at -0.5 MHz _____V
D) Pulse level at 9345.5 MHz _____V
E) Difference voltage between -0.5 & +0.5 MHz

0.09 V _____0.11 V

6-25B. FINAL 30 MHz DISCRIMINATOR AND PANEL (ΔF) METER CALIBRATION (For Sets S/N 109 & on)

DESCRIPTION: An L-Band Signal Generator, Pulse Generator, Spectrum Analyzer, and Oscilloscope are used to make final adjustments to the Discriminator Module. Ref. Schematic 4-25-124.

TEST EQUIPMENT: Oscilloscope, L-Band Signal Generator, Pulse Generator, Spectrum Analyzer, 50 ohm Load, and 20 dB Coaxial Attenuator (Table 6-1).

PROCEDURE:

1. Disconnect power from RD-300.

2. Remove the 30 MHz Discriminator Module from its housing. Support the module on the housing using cardboard to insulate the module from the housing. Remove Board B from module cover.

3. Connect L-Band Signal Generator, Pulse Generator, 20 dB Coaxial Attenuator, and Spectrum Analyzer as per Fig. 6-6.

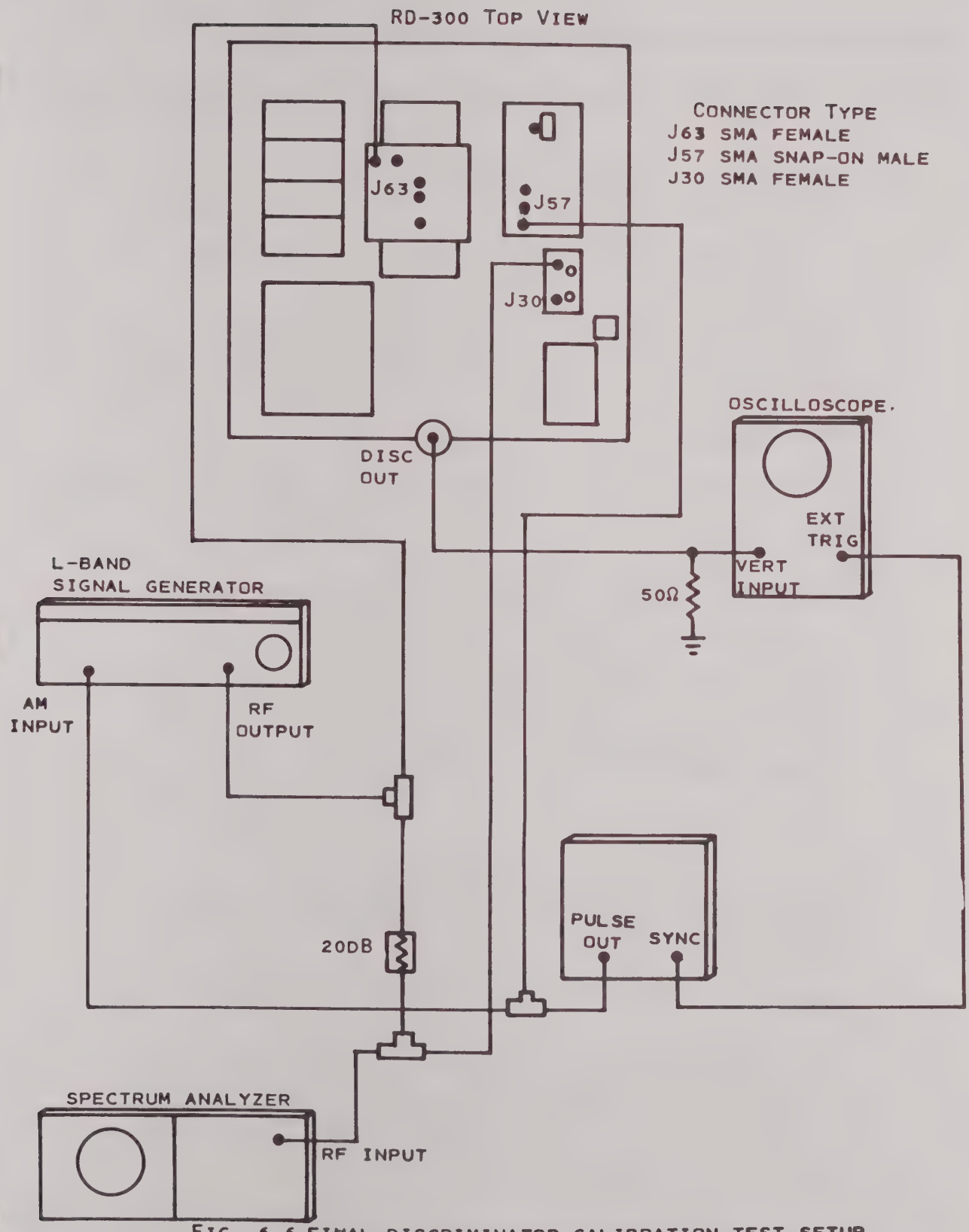


FIG. 6-6 FINAL DISCRIMINATOR CALIBRATION TEST SETUP

6-25B. FINAL 30 MHz DISCRIMINATOR AND PANEL (ΔF) METER CALIBRATION (cont'd)

4. Set RD-300 controls as follows:

RF/IF Mode Selectors (25)	RF TRACK
MODULATION Mode Selectors (42)	CW
CONTOUR (14)	OFF
ΔF (6)	CAL (detent)
OUTPUT Controls (13 & 18)	-100 dBm

5. Set Signal Generator controls as follows:

FREQUENCY	1095.00 MHz (phase-locked)
OUTPUT LEVEL	-5 dBm
MODULATION Mode	PULSE

6. Set Pulse Generator controls as follows:

PULSE REPETITION FREQUENCY	500 Hz
PULSE WIDTH	5 µs
PULSE AMPLITUDE	2 V p-p, -1 V baseline (into 50 Ω input impedance of AM INPUT of signal generator).

7. Connect RD-300 Front Panel DISC OUT Connector (20) to Oscilloscope. Terminate Oscilloscope Input with 50 Ohm Load. Set Oscilloscope for 20 mV/division and 10 µs/division.

8. Apply power to RD-300; TRACK Indicator (28) should come ON.

9. Verify that the Digital Display (12) reads 9345.00 MHz. (The Test Set's L-Band VCO will then be at 1095.00 MHz). Verify that the scope display shows first the "Information" pulse due to the external L-Band Signal Generator and then the 40 µs "Calibration" pulse occuring 40 µs after the Information Pulse.

6-25B. FINAL 30 MHz DISCRIMINATOR AND PANEL (ΔF) METER CALIBRATION (cont'd)

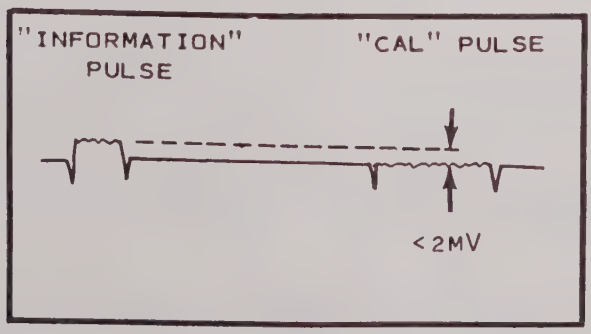
10. Adjust L-3 on 30 MHz Discriminator Board A slightly until the calibration pulse is within 2 mV of the Oscilloscope baseline.

11. Verify that the middle portion of the Information and Calibration Pulse are both within 2 mV of each other.

12. Connect the Oscilloscope to TP-3 and adjust L-4 slightly for maximum negative-going pulses. Vary ΔF Control (6) and verify the Information Pulse and the Panel Meter (8) ΔF scale indication both move and that the TRACK Indicator (28) is on.

_____(✓)

13. Select MAN (42) and then select TRACK Mode (42) and verify that the frequency display searches and within 3 seconds stops at 9345 MHz (1095 MHz at L-Band). Adjust the Front Panel Fine Offset Adjust (21) slightly until the middle portion of the Information Pulse is within 2 mV of the level of the Calibration Pulse. (This control is a screwdriver adjusted potentiometer located on the Front Panel just above the DISC OUT Connector). If the Fine Offset Adjust (21) does not have enough range to accomplish the adjustment, adjust the control to the middle of its range. Then adjust R-66, Coarse OFFSET, on Board A, until the Information and Calibration Pulses match within 10 mV. The Front Panel Fine Offset Adjust (21) should then be capable of fine adjustment to within 2 mV.



_____(✓)

6-25B. FINAL 30 MHz DISCRIMINATOR AND PANEL (ΔF) METER CALIBRATION (cont'd)

14. Tune the Spectrum Analyzer to 1095 MHz, and center the main lobe of the pulse spectrum in the display. Set the analyzer controls as follows:

BANDWIDTH	30 kHz
SCAN WIDTH	100 kHz/div
LOG REFERENCE LEVEL	-50 dBm
RF ATTENUATION	10 dB
LOG DISPLAY	10 dB/div

15. Verify that the tracking error is less than 25 kHz as defined in Figure 6-7.

_____(✓)

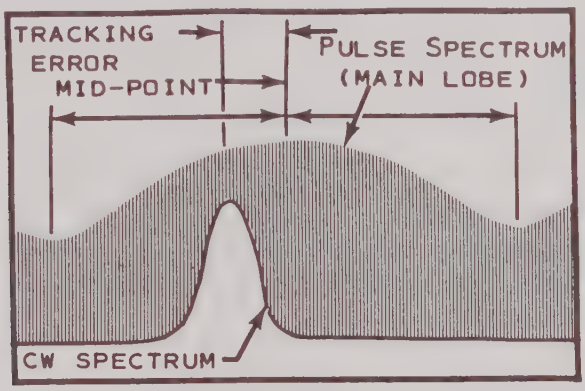


Fig. 6-7 Spectrum Analyzer Display of Tracking Error

16. Monitor Pin 9 of X-1 Bd. A on the Oscilloscope (ac coupling, 0.2 V/div, 10 μs/div). Adjust all the tuning capacitors on the Single Side Band Module slightly to peak both the Information and Calibration Signals.

_____(✓)

PANEL METER ΔF SCALE CALIBRATION

17. Set RF/IF Mode Selector (25) to TRACK

6-25B. FINAL 30 MHz DISCRIMINATOR AND PANEL (ΔF) METER CALIBRAITON (cont'd)

NOTE

The following steps constitute a procedure that matches the Panel Meter (8) ΔF indication to the Digital Freuqency Display (12). It will be necessary to make repeated adjustments carefully to obtain the required results.

18. Adjust ΔF ZERO (R-44) Potentiometer on 30 MHz Discriminator Board B Until Panel Meter (8) ΔF indication is 0 . Note and record Reference Frequency on RD-300 Digital Display (12).

Ref. Freq._____MHz

19. Set RF/IF Mode Selector (25) to MAN.

20. Using MAN FREQ Controls (10), set RD-300 Digital Display (12) to Reference Frequency plus 0.50 MHz.

21. Adjust ΔF CAL (R-41) on Board B until Panel Meter (8) ΔF indication is +0.50 MHz.

_____(✓)

22. Re-check Panel Meter (8) ΔF scale indication at reference frequency and repeat Steps 17 and 18 if necessary. (If the ZERO Adjustment is far off, repeat Steps 17 through 22).

23. Using MAN FREQ Controls (10), set RD-300 Digital Display (12) to Reference Frequency minus 0.50 MHz.

24. Adjust Coil L-2 on Board A until Panel Meter (8) ΔF indication is -0.50 MHz.

_____(✓)

25. If necessary, repeat Steps 17 through 24 until Panel Meter (8) ΔF indication is correct at Reference Frequency (0), Ref. Freq. +0.05 MHz, and Ref. Freq. -0.05 MHz.

Ref. Freq. _____(✓)
Ref. Freq. +0.05 _____(✓)
Ref. Freq. -0.05 _____(✓)

26. Connect Oscilloscope to DISC OUT Connector (20) with 50 ohm termination.

6-25B. FINAL 30 MHz DISCRIMINATOR AND PANEL (ΔF) METER CALIBRATION (cont'd)

27. Set Oscilloscope controls as follows:

SWEEP . . . . . 1 μs/division

VERTICAL. . . . . 0.01 Volts/division

NOTE

If requirements of Step 28, 29 and 30 are not met, adjust DISC. CAL (R-23) potentiometer for pulse magnatude of 50 m Volts at plus and minus 0.5 MHz from reference frequency.

28. Using MAN FREQ Controls (10), set Front Panel Meter (8) to zero frequency deviation (Reference Frequency) and note pulse level in reference to baseline.

_____V

29. Using MAN FREQ. Controls (10), set Front Panel Meter (8) to Reference Frequency minus (-) 0.50 MHz. Verify that pulse increases in amplitude to +0.05 V from pulse level of Step 28.

_____(✓)

30. Using MAN FREQ. Controls (10), set Front Panel Meter (8) to Reference Frequency plus (+) 0.50 MHz. Verify that pulse decreases in amplitude to -0.05 V from pulse level of Step 28.

_____(✓)

6-26. PANEL METER PEAK POWER SCALE CALIBRATION (X-Band Signal Generator Method)

DESCRIPTION: The path loss between the Front Panel RF Output Connector (31) and the Detector Diode is measured. A known amount of pulsed power, that depends on the measurement data, is then applied directly to the Detector Diode, and the circuitry is adjusted to calibrate the Panel Meter (8) power indication.

TEST EQUIPMENT: X-Band Signal Generator, RF Power Meter (with 100 mW head). TWT Amplifier, and Type N to Type SMA Adaptor.

REQUIREMENTS: ±0.6 dB from 2 to 12 kW

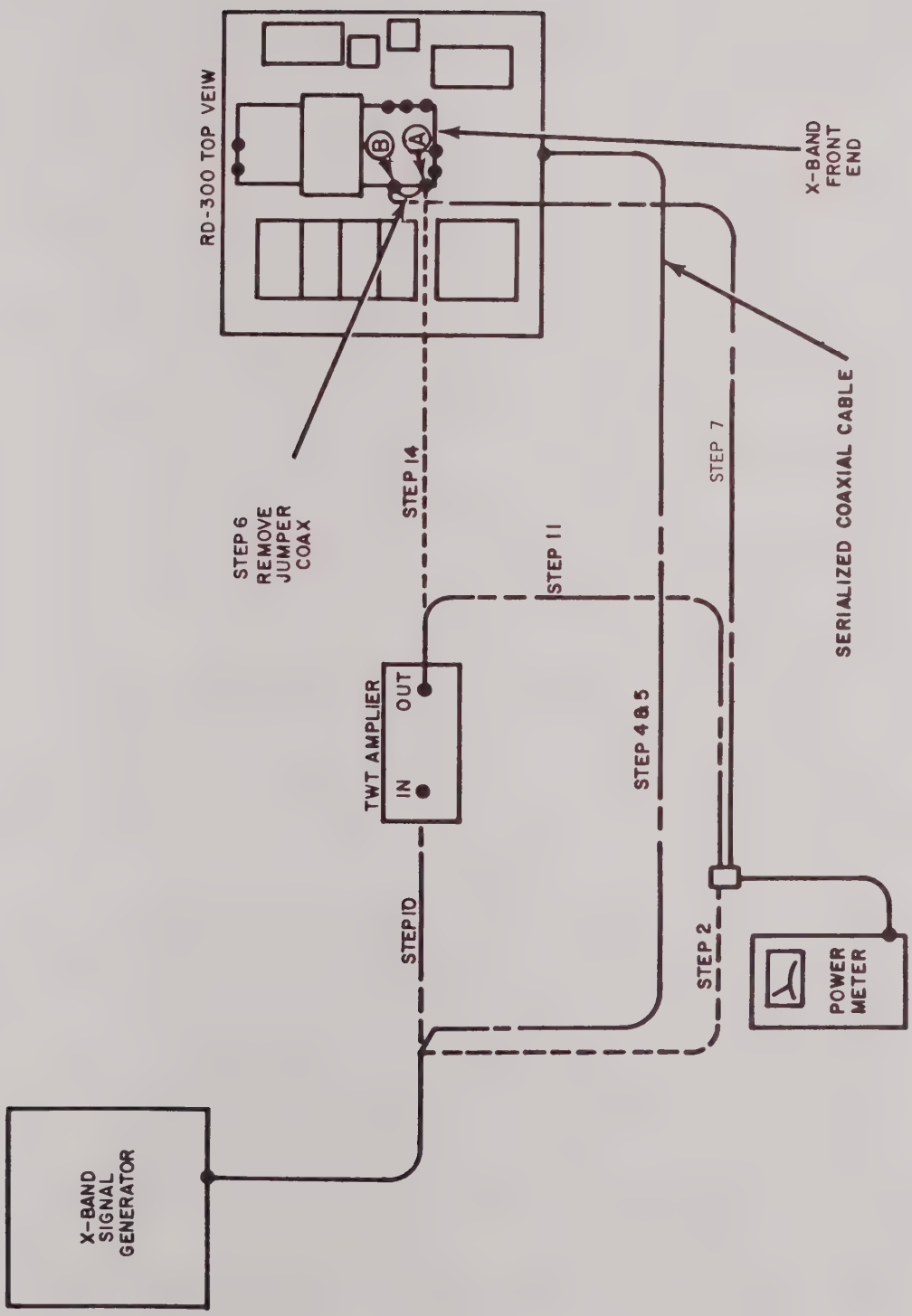


FIG. 6-8 PEAK POWER METER CALIBRATION SETUP

6-26. PANEL METER PEAK POWER SCALE CALIBRATION (X-Band Signal Generator Method) (cont'd)

PROCEDURE:

1. Press the LINE Switch (41) OFF.

2. Connect the X-Band Signal Generator to the Power Meter with a coaxial cable of appropriate type and length.

3. Set the X-Band Signal Generator controls for CW modulation at 9375 MHz frequency, and so that the Power Meter indicates 0 dBm output at the end of the coax.

4. Disconnect the coax used in Steps 2 and 3 from the Power Meter Head, and connect it to the free end of the Serialized Coaxial Cable.

5. Connect the Serialized Coaxial Cable to the Test Set RF Output Connector (31).

6. Remove the jumper coax between Connectors A and B (Figure 6-8 and Figure 8-38).

7. Use the Type N to Type SMA Adaptor to link Connector B of the X-Band Front End to the Power Meter Head.

8. Record the Power Meter indication at Connector B (nominal -33 dBm, ±2 dB).

_____dBm

NOTE

In sets S/N 96 through 99 the X-Band Front End consisted of discrete components which are delineated in Figure 4-1. In this assembly, Connectors A and B are the coaxial connectors that lie between the 30 dB Attenuator and the Detector. (See Floor Assembly Dwgs in Sect. X). Disconnect the Diode and use a 90° Elbow Connector to attach a coax from the Power Meter Head to Connector B. Then record the Power Meter indication in Step 8.

9. Reduce the X-Band Signal Generator output to -40 dBm or below.

10. Disconnect the coax used in Steps 4 and 5 from the serialized coax and connect it to the input of the TWT Amplifier.

6-26. PANEL METER PEAK POWER SCALE CALIBRATION (X-Band Signal Generator Method) (cont'd)

11. Using the serialized coax, connect the TWT Amplifier output to the Power Meter Head.

12. Adjust the X-Band Signal Generator output and the TWT Amplifier gain until Power Meter indicates the end product of the following formula:

10 kW Power = (+70 dBm) + (Step 8 Data) - (Mean Coupling Factor)[1]

Example: Step 8 Data = -32.0 dBm
Mean Coupling Factor = 20.2 dBm

$\therefore$ 10 kW Power = (+70) + (-32.0) -(20.2)
= +17.8 dBm

$\therefore$ The X-Band Signal Generator output and TWT Amplifier gain should be adjusted until Power Meter reads +17.8 dBm.

CAUTION

TO PREVENT DAMAGE TO THE DETECTOR DIODE, DO NOT APPLY MORE THAN +20 dBm to CONNECTOR A of X-BAND FRONT END.

13. Set PWR/ΔF Switch (7) to PWR.

14. Disconnect the Step 11 serialized coax cable from Power Meter Head, and connect it to X-Band Front End Connector A.

15. Set the X-Band Signal Generator controls to a pulse modulation (3 μs at 380 Hz, typically).

16. Press the LINE Switch (41) ON.

NOTE

If requirement of Step 17 is not met, perform Steps 18 through 20. Otherwise, omit Steps 18 through 20 and perform Steps 21 and 22.

17. The Panel Meter (8) should indicate 10 (+1.5, -1.3) kW.

8.7 kW_____11.5 kW

18. Press the LINE Switch (41) OFF.

[1]Printed on Waveguide Directional Coupler.

6-26. PANEL METER PEAK POWER SCALE CALIBRATION (X-Band Signal Generator Method) (cont'd)

19. Remove AUX. Board from module and, with an insulating material under the module, lay the AUX Board on the module.

20. Press the LINE Switch (41) ON, and adjust POWER MTR CAL (R-48) (R-38 in sets prior to ser. no. 213) Potentionmeter on AUX. Board until Panel Meter (8) indicates 10 kW.

8.7 kW_____11.5 kW

21. Repeat Steps 11 through 16 for the following Power Meter indication:

2 kW Power = (+63 dBm) + (Step 8 Data) - (Mean Coupling Factor)[1]

Example: Step 8 Data = -32.0 dBm
Mean Coupling Factor = 20.2 dB

2 kW Power = (+63) + (-32.0) - (20.2)
= +10.8 dBm

NOTE

If requirement of Step 22 is not met, perform Steps 23 through 26. Otherwise, omit Steps 23 through 26.

22. The Panel Meter (8) should indicate 2 (+0.3, -0.26) kW.

1.74 kW_____2.3 kW

23. Press the LINE Switch (41) OFF.

24. Remove AUX. Board per Step 19.

25. Press the LINE Switch (41) ON, and adjust ZERO (R-46) (R-34 in sets prior to ser. no. 213) Potentiometer on AUX. Board until Panel Meter (8) indicates 2 kW.

1.74 kW_____2.3 kW

26. Repeat Steps 11 through 25 until the 2 and 10 kW indications are correct.

[1]Printed on Waveguide Directional Coupler

6-27. SERVO SIMULATOR BOARD, 8° Reference-to-Output Phase Shift Adjustment.

DESCRIPTION: An Oscilloscope is used to adjust the 55.55 µs (8° at 400 Hz) time delay between the zero crossing points of the Phase Shift Input Signal (P-73-W) and the Sine Resolver Signal Output (P-73-R). Ref. Schematic: 4-25-112.

TEST EQUIPMENT: Function Generator, Oscilloscope (Table 6-1), Resolver Load Simulator (Fig. 5-9)

REQUIREMENTS: Output at P-73-R leads Input at P-73-W by 8° (55.55 µs at 400 Hz).

PROCEDURE:

1. Set RD-300 controls as follows:

   ANGLE Selector (33). . . . . 89°

   ANT RATE (32). . . . . OFF (Full ccw)

2. Press Left Quadrant (35) pushbutton and verify that "L" Quadrant Indicator (36) is ON.

3. Connect the Function Generator to ANT SIMULATOR Connector (37) (P-73) Pins W (hot) and Z (ground). Adjust the Function Generator for a 400 Hz sinewave output of 5 V p-p to 10 V p-p.

4. Connect ANT SIMULATOR Connector (37) (P-73) Pin S to ground. Connect Resolver Output Load as in Figure 5-9.

5. Connect Oscilloscope Channel A to P-73-W and Channel B to P-73-R.

6. Set Oscilloscope controls for 10 µs/division and 0.2 V/division

7. Trigger the Oscilloscope on Channel A and adjust Oscilloscope controls until zero of both waveforms is positioned at the middle of the screen (vertical 0 graticule).

8. The time difference between Channel A and B waveforms at the zero crossing point should be 55.55 µs (8° at 400 Hz). Adjust Potentiometer R-85 on Servo Simulator Board as necessary.

   41.67 µs _____ 83.33 µs

6-28. X-BAND FRONT END REPLACEMENT PROCEDURE.

DESCRIPTION: This procedure describes the mechanical and electrical operations necessary to replace the X-Band Front End, to eliminate the Compensator Board (on some sets prior to S/N 200), and to make the required electrical adjustments to recalibrate the Test Set. Ref Drawing: 4-25-006 and Schematic: 2-25-123.

TEST EQUIPMENT: Power Meter

PROCEDURE:

1. Disconnect power cable from RD-300.

2. Remove top and bottom covers of Test Set.

3. Remove the top front screws holding the Servo Simulator Board, and swing the board towards the back of the Test Set.

4. Remove the cables from the following connectors in the SSB Module:

   A) Power Connector J-12

   B) Coaxial Connectors J-60, J-63, and J-81.

5. Remove cables from Coaxial Connectors J-22, J-23, J-24, J-25, and J-28 of the X-Band Front End Module.

6. Place Test Set on one side, and remove the four screws holding the SSB Module. Remove the SSB Module from the Test Set.

7. Remove coaxial cable from Connector J-26 of the back of the Front End Module. Do not disconnect the cable on J-27.

8. Remove the four screws from the bottom of the Test Set holding the X-Band Front End Module. Lift out the Front End Module. Transfer the cable connected to J-27 to the new Front End Module, J-27.

9. Install the new X-Band Front End Module, and replace coaxial cables to J-22, J-23, J-24, J-25, J-26 and J-28.

10. Replace the SSB Module and replace cable to J-12 Power Connector and coaxial cables to J-60, J-63 and J-81.

COMPENSATION BOARD REMOVAL (On Some Sets prior to S/N 200)

11. Remove the right side cover of the Test Set.

6-28. X-BAND FRONT END REPLACEMENT PROCEDURE (cont'd)

12. Remove the red, yellow, black, grey, and blue harness wires from the Compensation Board.

13. Cut short, and tap, or insulate, the red, yellow, black, and grey wires.

14. Remove the Compensation Board and blue wire between the board and the Main Diode Switch Module.

15. Connect the blue harness wire to the Main Diode Switch Module. This blue wire comes from Pin 12 of J-8 on the Auxiliary Board.

16. Perform Paragraph 6-21, RF OUTPUT AND AUX OUT CONNECTOR OUTPUT LEVEL ADJUSTMENT.

Calibration Record

RD-300
RADAR TEST SET

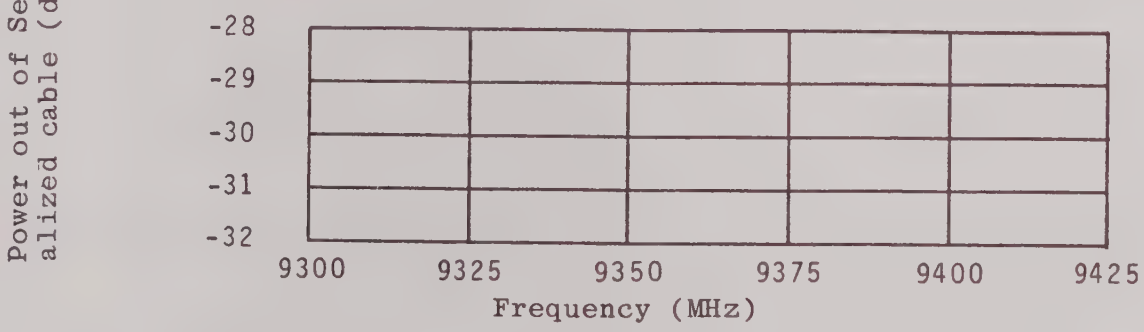
Calibrated By_____
Date_____

Serial No._____

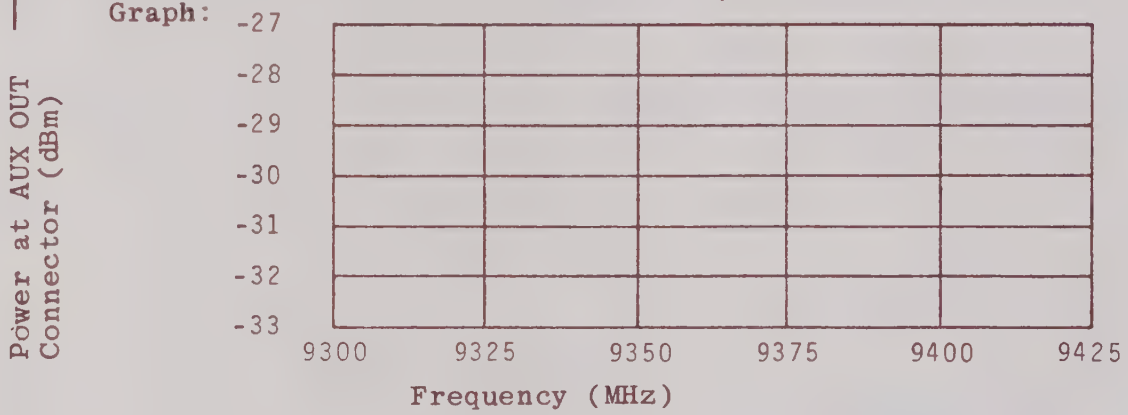
PARA NO.	CALIBRATION DESCRIPTION	RESULTS MIN	ACTUAL	MAX
6-9	METER MECHANICAL ZERO _____(✓) CHECK AND ADJUSTMENT			
6-10	INITIAL PROCEDURE Power Source	V ac		V ac
	(115(±11.7)Vac)	103.3	_____	126.7
	(230(±16.0)Vac)	214.0	_____	246.0
6-11	POWER SUPPLY VOLTAGE TEST			
	Voltage Ripple Voltage	V dc		V dc
	+5 V dc _____15 mV p-p Max.	+4.7	_____	+5.3
	+12 V dc _____15 mV p-p Max.	+11.4	_____	+12.6
	-12 V dc _____15 mV p-p Max.	-11.4	_____	-12.6
	-24 V dc _____20 mV p-p Max.	-22.0	_____	-25.2
	-18 V dc _____ 0 Volts	-17.0	_____	-19.0
	+170 V dc N/A	+155	_____	+180
6-12	10 MHz SYSTEM CLOCK CHECK AND ADJUSTMENT	MHz 9.999500	_____	MHz 10.000500
6-13	900 MHz LOCAL OSCILLATOR CALIBRATION			
	2. Starting operation_____(✓)			
	3. Coil L-905 tuning_____(✓)	MHz		MHz
	5. Coil L-902	99.993	_____	100.007
	7. Resonators	-2 dBm	_____	+2 dBm
6-14	IF AND MARKER OSCILLATORS CALIBRATION			
	6. Marker Oscillator (High)	72 MHz	_____	74 MHz
	7. Marker Oscillator (Low)	17 MHz	_____	19 MHz
	11. X3 Saturation _____Volts			
	12. IF Oscillator (High)	71 MHz	_____	72 MHz
	14. IF Oscillator (Low)	18 MHz	_____	19 MHz
	15. Final check or adjustment:			
	Minimum Frequency	18 MHz	_____	19 MHz
	Maximum Frequency	71 MHz	_____	72 MHz

PARA. NO.	CALIBRATION DESCRIPTION	RESULTS MIN	ACTUAL	MAX
6-14	IF AND MARKER OSCILLATORS CALIBRATION (cont'd)			
	20. Mixer Balance _____(✓)			
	21. Marker Level at 60 MHz	-35 dBc	_____	
	24. Marker Level at 30 MHz	-35 dBc	_____	
	25. Sweep Width Dial _____(✓)			
	28. Sweep Width pot. (R-7) _____(✓)			
	29. Swept carrier is within 10% of dial setting at 2 & 4 MHz	1.8 MHz 3.6 MHz	_____ _____	2.2 MHz 4.4 MHz
6-15	PRESCALER AND COUNTER TEST			
	3. RD-300 Digital Display matches Counter Freq. Indication _____(✓)			
	4. Man. Freq. Control ____(✓)			
	5. Mkr. Freq. Control ____(✓)			
6-16	IF GENERATOR POWER AMPLIFIER CHECK AND ADJUSTMENT			
	3. Power Meter at 30 MHz	+18.0 dBm	_____	+22.0 dBm
	4. Power Meter at 60 MHz	+18.0 dBm	_____	+22.0 dBm
6-17.	BIAS/TUNE PC BOARD			
	2. Tuning Range	9425< MHz	_____ _____	<9295 MHz
	3. Frequency Display	9428 MHz	_____	9430 MHz
	5. Final check or adjustment:			
	Minimum Frequency	9290 MHz	_____	9292 MHz
	Maximum Frequency	9428 MHz	_____	9430 MHz
6-18	RF LEVELER CIRCUITRY CHECK			
	6. Power Level Power Level Vs. Freq. (±0.5 dB) _____(✓)	-5 dBm	_____	+1 dBm
	7. Voltage at P8-5 _____(✓)			
	9. Voltage at P8-1 _____(✓)			
	10. Voltage at P8-1 & P8-5 _____(✓)			
	11. Voltage at P8-4 _____(✓)			
	13. RF at J-32 (Approx. +18 dBm) _____(✓)			
	14. Frequency w/lowest output _____(✓)			
	15. Leveler Adj. pot._____(✓)			
	17. Power Constant at J-32 _____(✓)			

PARA NO.	CALIBRATION DESCRIPTION	RESULTS MIN	RESULTS ACTUAL	RESULTS MAX
6-19	CONTOUR dB CONTROL DIAL CALIBRATION 6. Contour Dial at 0 _____(✓) 8. R-36 & R-39 for 18.5 dBm _____(✓) 9. R-1 for 18.0 dBm _____(✓) 11. R-8 for -2 dBm _____(✓) 13. R-36 for +3 dBm _____(✓) 15. R-39 for +16 dBm _____(✓)			
6-20	LOCAL OSCILLATOR (8.25 GHz) LEAK-THROUGH CHECK 2. RF output, -38 dBm or less _____(✓) 4. Leak-through (8.25 GHz) _____(✓)		dBm _____	-38 dBm
6-21	RF OUTPUT AND AUX OUT CONNECTOR OUTPUT LEVEL ADJUSTMENT 3. Filter Loss _____dB 7. RF Output Frequency Sensitivity Graph:			



PARA NO.	CALIBRATION DESCRIPTION	RESULTS MIN	ACTUAL	MAX
6-21	RF OUTPUT AND AUX OUT CONNECTOR OUTPUT LEVEL ADJUSTMENT (cont'd) 10. Frequency at -30 dBm _____MHz 13. AUX. Out Connector Output Frequency Sensitivity Graph:			



	16. Frequency at -30 dBm _____MHz			
6-22	PRF Hz CONTROL AND WIDTH µs CONTROL DIAL CALIBRATIONS			
	2. PRF Hz Control at 50 _____(✓)			
	3. PRF at 50	45 Hz	_____	55 Hz
	4. PRF at 500	450 Hz	_____	550 Hz
	9. Pulse Width µs Control _____(✓)			
	10. Pulse Width (at 2 µs)	1.6 µs	_____	2.4 µs
6-23A	30 MHz PULSE DISCRIMINATOR (For Sets Prior to S/N 109)			
	10. Coil L-3 _____(✓)			
	12. Coil L-4 _____(✓)			
	14. THRESHOLD ADJUST (R-42) _____(✓)			
	16. INTEGRATOR OFFSET (R-31) _____(✓)			
	17. Positive Pulse is 3 µs _____(✓)			
	20. Pulse Amplitude _____Volts			

PARA NO.	CALIBRATION DESCRIPTION	RESULTS MIN	ACTUAL	MAX
6-23A	30 MHz PULSE DISCRIMINATOR (cont'd) 21. Pulse Amplitude at 29.50 MHz _____Volts 24. Pulse Amplitude	0.05 V	_____	0.1 V
	27. Pulse Amplitude at 30.00 MHz _____Volts 28. Pulse Amplitude at 30.50 MHz _____Volts 29. Final Data: A. Pulse level at 29.50 MHz _____V B. Pulse level at 30.00 MHz _____V C. Difference Voltage at -0.5 MHz _____V D. Pulse level at 30.50 MHz _____V E. Difference Voltage at +0.5 MHz _____V F. Difference Voltage between -0.5 & +0.5 MHz.	0.09 V	_____	0.11 V
6-23B	30 MHz PULSE DISCRIMINATOR AND AND PANEL (ΔF) METER CALIBRATION (For Sets S/N 109 & on) 8. X1-15 is 1 V p-p _____(✓) 11. Coil L-2 _____(✓) 13. CARRIER BALANCE (R-36) _____(✓) 14. Coil L-3 _____(✓) 18. Coil L-4 _____(✓) 19. Coil L-2 for equal pulses _____(✓) 21. DISC. CAL. (R-23)_____(✓) 24. ΔF ZERO (R-44) _____(✓) _____MHz			
	26. ΔF CAL (R-41) 28. Coil L-2	+0.45 MHz -0.55 MHz	_____ _____	+0.55 MHz -0.45 MHz

PARA NO.	CALIBRATION DESCRIPTION	RESULTS MIN	ACTUAL	MAX
6-24	SINGLE SIDEBAND TUNING			
	4. Oscillator Starts _____(✓)			
	5. C-7, C-8 _____(✓)			
	9. Coil L-1 _____(✓)			
	10. C-7 & C-8 _____(✓)			
	14. VSWR Vs. Freq. _____(✓)			
	19. Trimmer Cap. _____(✓)			
	26. 30 MHz Cal. Signal _____(✓)			
	29. VCO Leak-through		_____	-85 dBm
	33. VCO Leak-through		_____	-85 dBm
	39. 30 MHz Information Signal	-33 dBm	_____	-28 dBm
6-25A	FINAL 30 MHz DISCRIMINATOR CALIBRATION (For Sets Prior to S/N 109)			
	10. Digital Display is 9345.00 MHz _____(✓)			
	11. Track Indicator at 9345.00 MHz _____(✓)			
	12. Threshold Adj. (R-42) _____(✓)			
	13. Zero Control Adjust _____(✓)			
	14. 1 MHz change = 0.1 V (±0.01 V)	0.09 V	_____	0.11 V
	15. Discriminator Pulse Amplitude _____(✓)			
	16. Pulse Amplitude at 9344.50 MHz _____(✓)			
	19. Pulse Amplitude above base line	0.05 V	_____	0.1 V
	22. Pulse Amplitude above base line		_____	
	23. Pulse Voltage level		_____	
	24. Final Data:			
	A) Pulse level at 9345.0 MHz _____V			
	B) Pulse level at 9345.50 MHz _____V			
	C) Difference Voltage at -0.5 MHz _____V			
	D) Pulse level at 9345.5 MHz _____V			
	E) Difference voltage between -0.5 V & +0.5 MHz	0.09 V	_____V	0.11 V

PARA NO.	CALIBRATION DESCRIPTION	RESULTS		
		MIN	ACTUAL	MAX
6-25B	FINAL 30 MHz DISCRIMINATOR AND PANEL (ΔF) METER CALIBRATION (For Sets S/N 109 & on)			
	12. TP-3, Maximum Negative Pulse _____(✓)			
	13. Track Mode Lock-On and Information Pulse Amplitude _____(✓)			
	16. X-1, pin 9 _____(✓)			
	18. Reference Frequency _____MHz			
	21. ΔF CAL (R-41) for +0.50 MHz _____(✓)			
	24. Coil L-2 for -0.50 MHz _____(✓)			
	25. Ref. Freq. _____(✓)			
	Ref. Freq. +0.05 MHz _____(✓)			
	Ref. Freq. -0.05 MHz _____(✓)			
	28. Pulse Level _____V			
	29. Pulse Level to +0.05V _____(✓)			
	30. Pulse Level to -0.05V _____(✓)			
6-26	PANEL METER PEAK POWER SCALE CALIBRATION			
	8. Power Meter Indication	-35 dBm	_____	-31 dBm
	17. Panel Meter (10 kW)	8.7 kW	_____	11.5 kW
	20. Panel Meter (10 kW)	8.7 kW	_____	11.5 kW
	22. Panel Meter (2 kW)	1.74 kW	_____	2.3 kW
	25. Panel Meter (2 kW)	1.74 kW	_____	2.3 kW
6-27	SERVO SIMULATOR BOARD (for 8°)			
	8. Time Difference	41.67 μs	_____	83.33 μs

SECTION VII

7-1. Introduction.

7-2. This section is designed to aid the technician in trouble-shooting by providing pin-outs of the I.C.s used in the test set. Truth tables have also been supplied for some of the more functionally complex types of logic circuit. Positive logic is used throughout.

7-3. The following is a list of the symbols used in the truth tables and brief definitions of the symbols:

X - don't care, status of input irrelevent
S - output stays the same, doesn't change
H - high logic level
L - low logic level
↑ - transition from low to high logic level, positive edge triggering occurs
↓ - transition from high to low logic level, negative edge triggering occurs
U - unstable, this output will decay to another logic level
Toggle - The outputs change to their complementary logic levels
- one high level pulse
- one low level pulse

7-4. Types of Logic Gates.

7-5. Basicaly, there are eight types of logic gates: buffers, inverters, OR, NOR, XOR (exclusive OR), AND, NAND and the Data Selector.

7-6. The buffer is used to improve fanout, condition pulses, etc. The buffer is schematically represented as:

The truth table of the buffer is:

Input	Output
H	H
L	L

7-7. The inverter is similar to the buffer except that, the output is the logical complement of the input. The inverter is schematically represented as:

The truth table of the inverter is:

Input	Output
H	L
L	H

7-8. The OR gate performs the logical OR function. If any input goes high, the output is high. The output is low only when both inputs are low. The OR gate is represented schematically as:

The truth table of the OR gate is:

Inputs		Output
1	2	
L	L	L
L	H	H
H	L	H
H	H	H

7-9. The NOR or $\overline{OR}$ gate performs the logical OR function. If any input goes high, the output is low. The output is high only when both inputs are low. The NOR gate is represented schematically as:

The truth table of the NOR gate is:

Inputs		Output
1	2	
L	L	H
L	H	L
H	L	L
H	H	L

7-10. The output of the EXCLUSIVE OR or XOR gate goes high when one and only one of the inputs are high. The output of the XOR gate is low when both inputs are high. The XOR gate is represented schematically as:

The truth table of XOR gate is:

Inputs		Output
1	2	
L	L	L
L	H	H
H	L	H
H	H	L

7-11. The output of the AND gate goes high only when all of the inputs are high. The AND gate is represented schematically as:

The truth table of the AND gate is:

Inputs		Output
1	2	
L	L	L
L	H	L
H	L	L
H	H	H

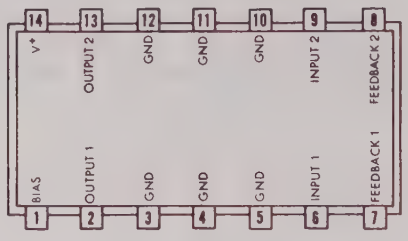
7-12. The output of the NAND or $\overline{\text{AND}}$ gate goes low only when all of the inputs are high. the NAND gate is represented schematically as:

The truth table of the NAND gate is:

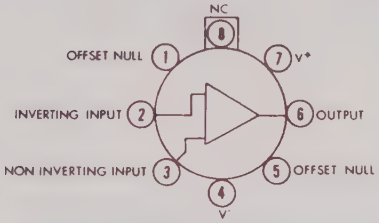
Inputs		Output
1	2	
L	L	H
L	H	H
H	L	H
H	H	L

7-13. The Data Selector can be considered as a solid state switch. The desired input(s) is chosen by activating the appropriate SELECT input(s). This enables data from the selected input(s) to be made available at the output pin(s) of the Data Selector.

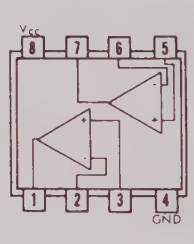
INTEGRATED CIRCUIT GUIDE



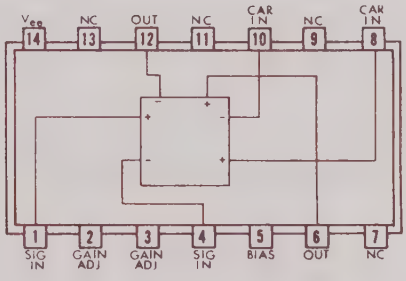
LM377/LM1877
2 WATT AUDIO AMP.



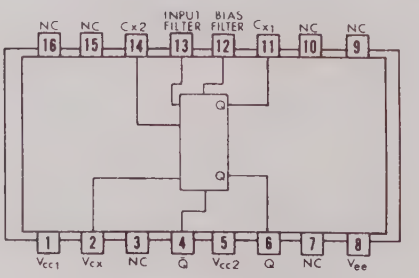
LM741
OP/AMP



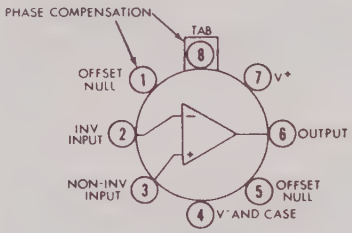
LM1458, SN72558, 5558
DUAL OP AMP



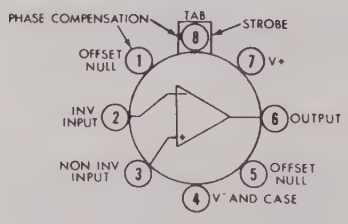
MC1496
MODULATOR-DEMODULATOR



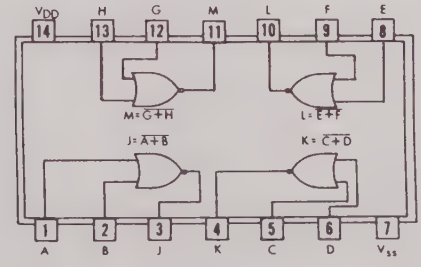
MC1658
MULTIVIBRATOR



CA3100
OP AMP

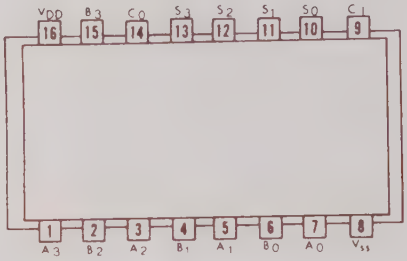


CA3130
OP AMP



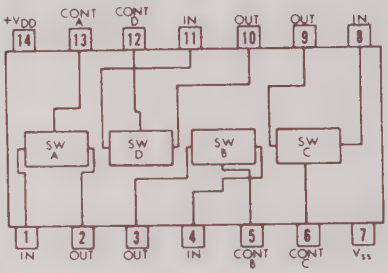
CD4001
QUAD 2-INPUT NOR

INTEGRATED CIRCUIT GUIDE

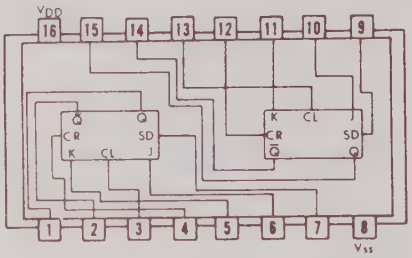


CD4008
4-BIT FULL ADDER

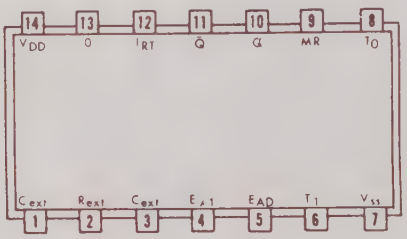
INPUTS			OUTPUTS	
Ai	Bi	Ci	Co	SUM
L	L	L	L	L
H	L	L	L	H
L	H	L	L	H
H	H	L	H	L
L	L	H	L	H
H	L	H	H	L
L	H	H	H	L
H	H	H	H	H



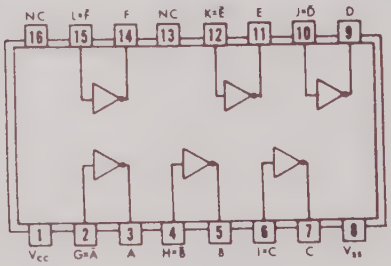
CD4016
QUAD CMOS ANALOG SWITCH



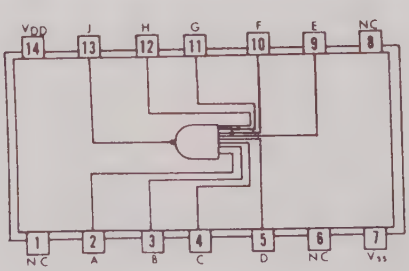
4027A
DUAL JK FLIP-FLOP



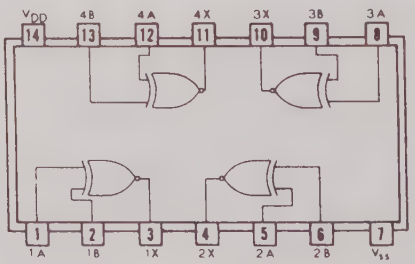
4047B
MONOSTABLE/ASTABLE
MULTIVIBRATOR



CD4049A
HEX INVERTER

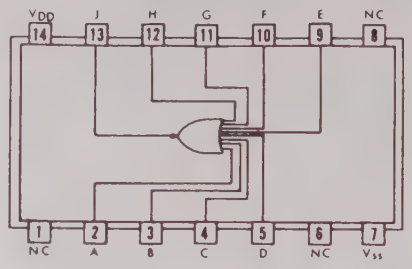


CD4068
8 INPUT NAND

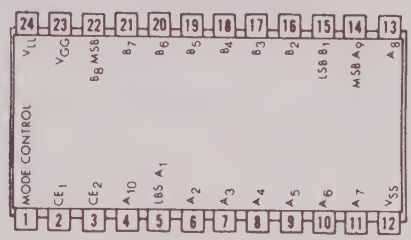


CD4077
2 INPUT XO GATE

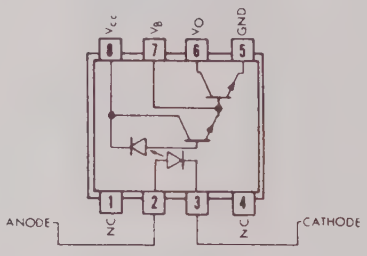
INTEGRATED CIRCUIT GUIDE



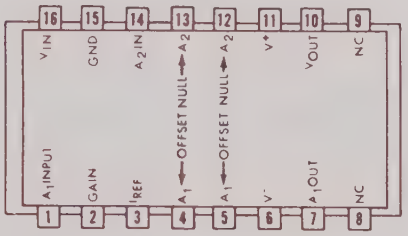
CD4078
COS/MOS 8 INPUT NOR GATE



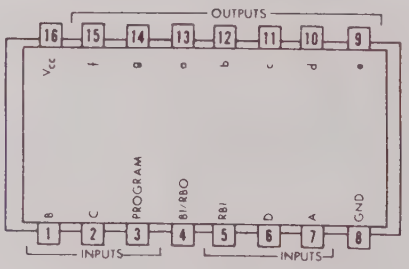
MM5232
ROM



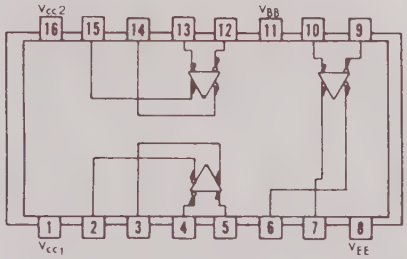
6N138/6N139
OPTICAL ISOLATOR



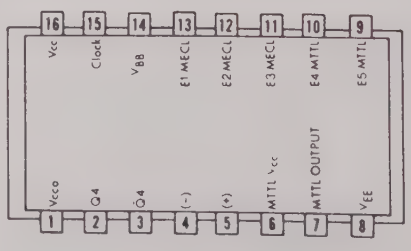
8049
MONOLITHIC ANTILOG AMPLIFIER



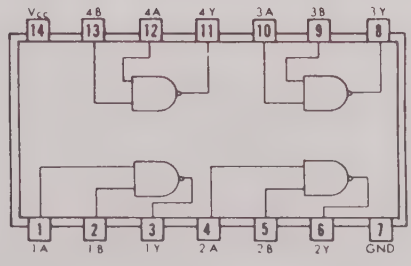
DM8880/DD700
DECODER DRIVER



MC10116
TRIPLE LINE RECEIVER

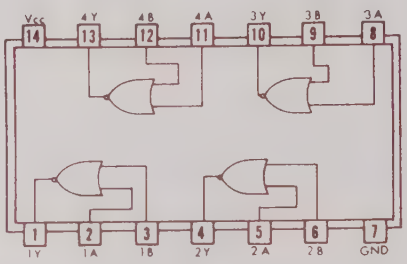


MC12013
TWO-MODULUS PRESCALER

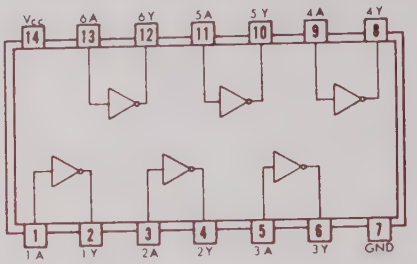


7400
2 INPUT NAND GATE

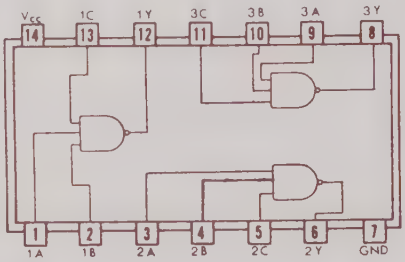
INTEGRATED CIRCUIT GUIDE



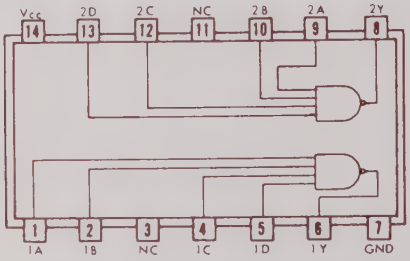
7402
2 INPUT NOR GATE



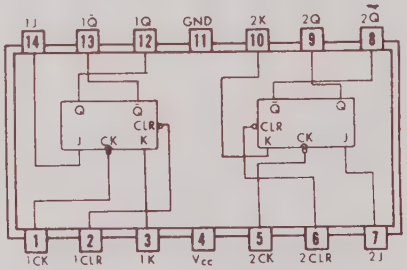
7404, 7405
HEX INVERTER



SN7412
3 INPUT NAND GATES

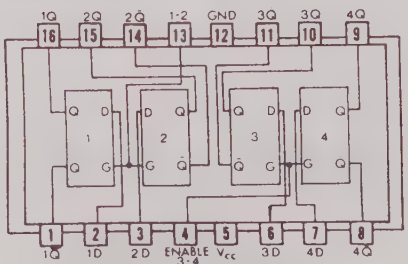


SN7420
QUAD INPUT NAND

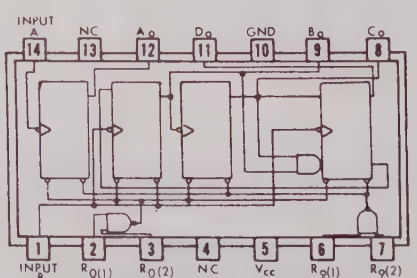


7473
DUAL J-K FLIP-FLOP

INPUTS				OUTPUTS	
CLEAR	CLOCK	J	K	Q	Q̄
L	X	X	X	L	H
H	⎍	L	L	S	S
H	⎍	H	L	H	L
H	⎍	L	H	L	H
H	⎍	H	H	TOGGLE	

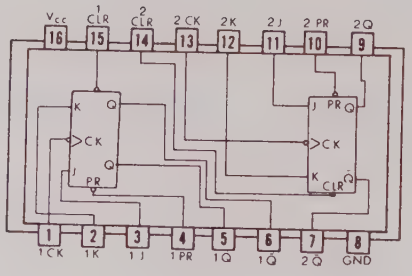


7475
4-BIT LATCH



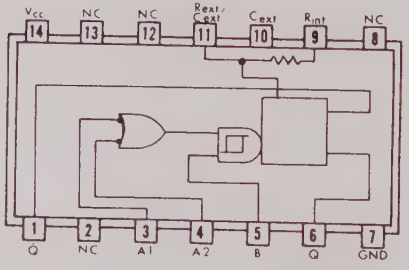
7490
DECODER COUNTER

INTEGRATED CIRCUIT GUIDE



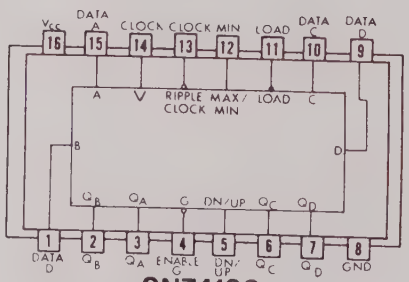
74S112
DUAL J-K FLIP-FLOP

INPUTS					OUTPUTS	
PRESET	CLEAR	CLOCK	J	K	Q	$\bar{Q}$
L	H	X	X	X	H	L
H	L	X	X	X	L	H
L	L	X	X	X	U	U
H	H	↓	L	L	S	S
H	H	↓	H	L	H	L
H	H	↓	L	H	L	H
H	H	↓	L	H	L	H
H	H	↓	H	H	TOGGLE	
H	H	H	X	X	S	S

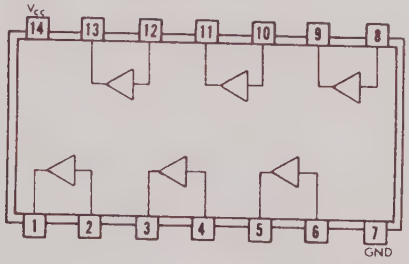


74121
MONOSTABLE MULTIVIBRATOR

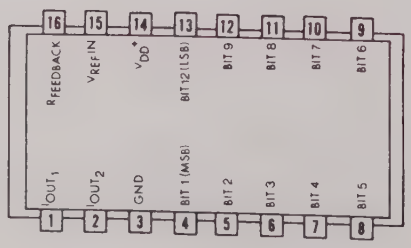
INPUTS			OUTPUTS	
A1	A2	B	Q	$\bar{Q}$
L	X	H	L	H
X	L	H	L	H
X	X	L	L	H
H	H	X	L	H
H	↓	H	⎍	⎍
↓	H	H	⎍	⎍
↓	↓	H	⎍	⎍
L	X	↑	⎍	⎍
X	L	↑	⎍	⎍



SN74190
SYCHRONOUS
DECADE COUNTER



MM74C902
HEX BUFFER



AD7520
D/A CONVERTER

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Fig. 8-1-1

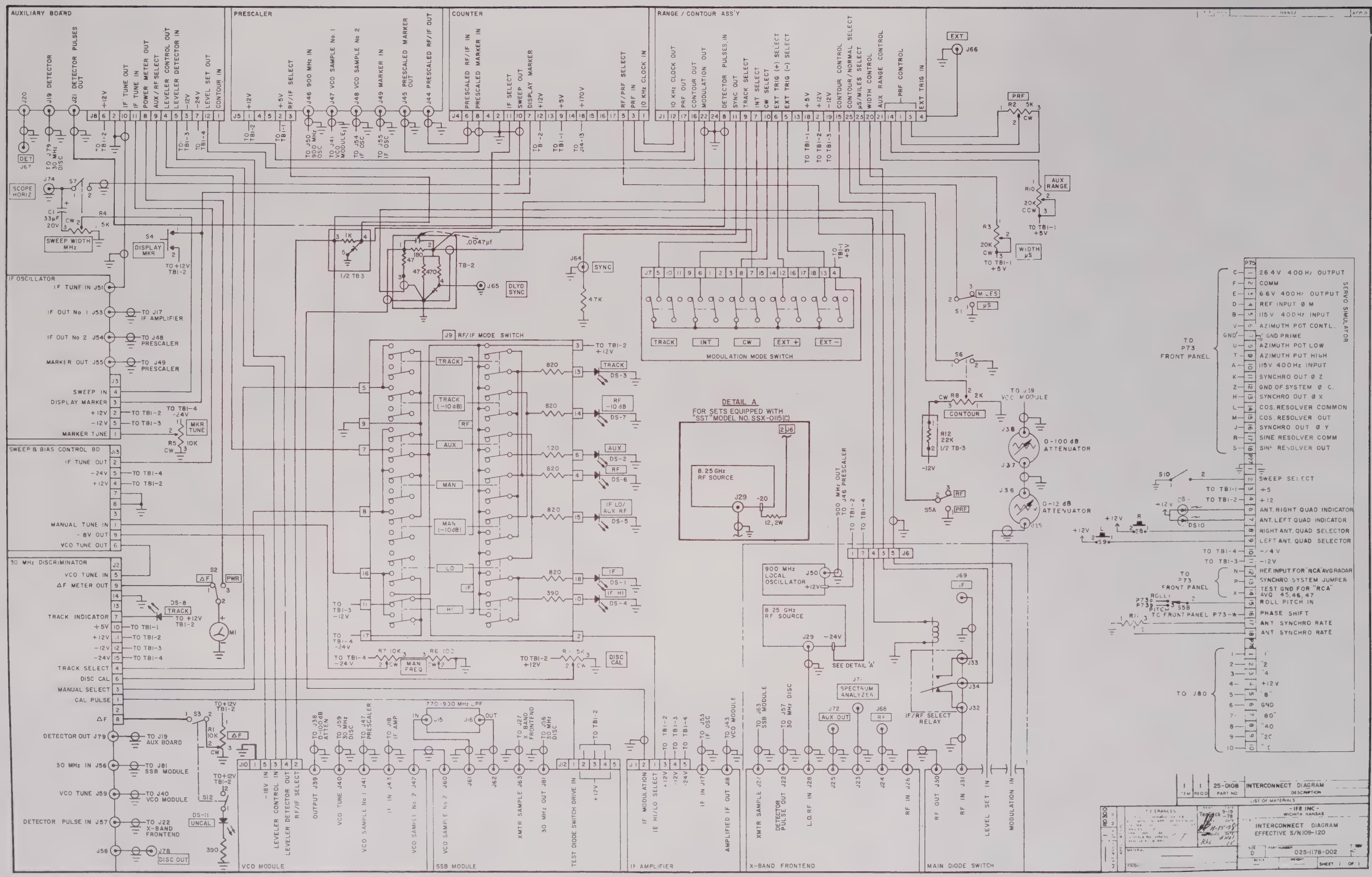
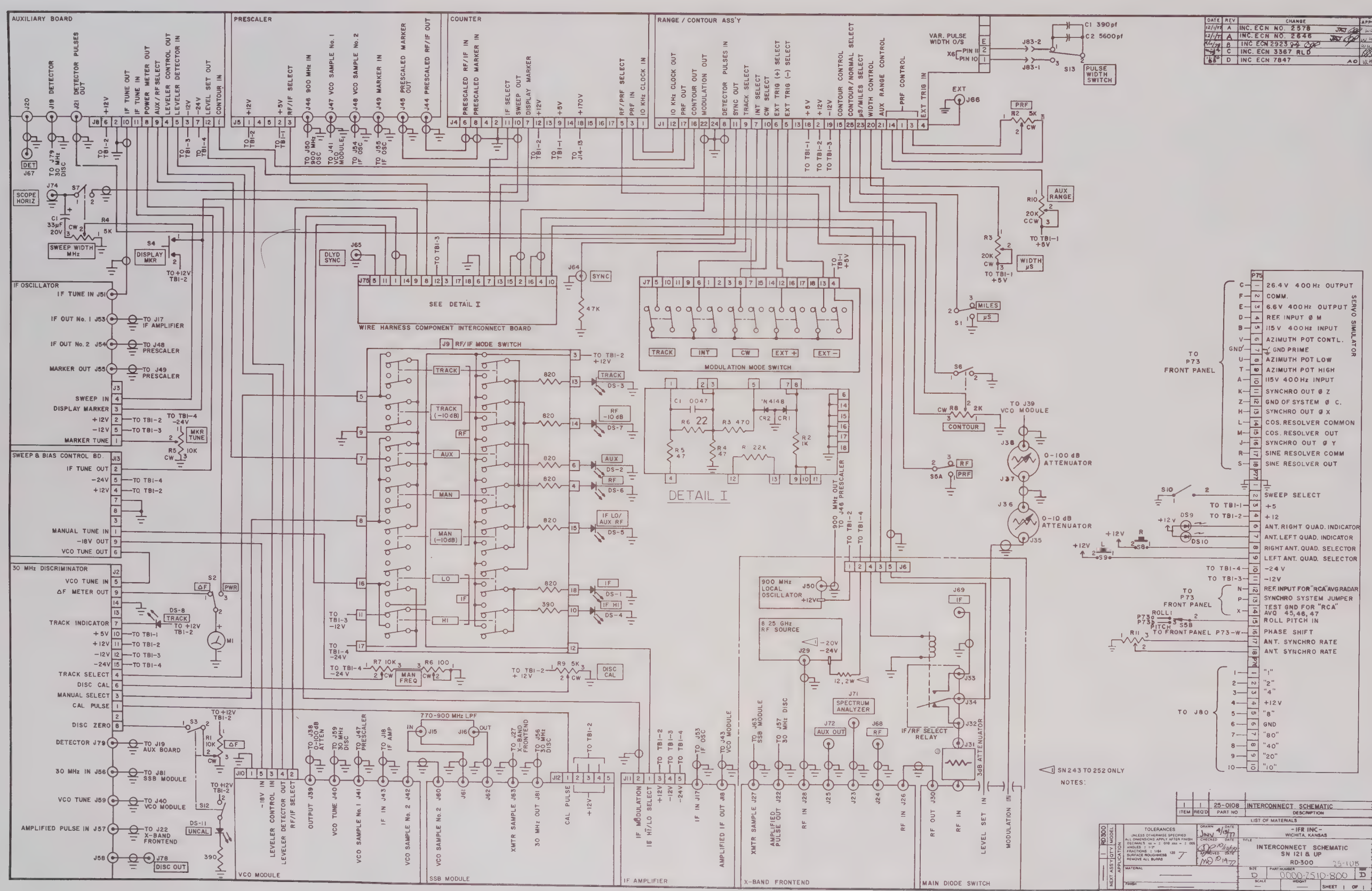

AUXILIARY BOARD
PRESCALER
COUNTER
RANGE / CONTOUR ASS'Y
IF OSCILLATOR
SWEEP & BIAS CONTROL BD
30 MHz DISCRIMINATOR
SERVO SIMULATOR
MODULATION MODE SWITCH
J9 RF/IF MODE SWITCH
DETAIL A
FOR SETS EQUIPPED WITH "SST" MODEL NO. SSX-0115(C)
8.25 GHz RF SOURCE
900 MHz LOCAL OSCILLATOR
SPECTRUM ANALYZER
IF/RF SELECT RELAY
0-100 dB ATTENUATOR
0-12 dB ATTENUATOR
VCO MODULE
SSB MODULE
IF AMPLIFIER
X-BAND FRONTEND
MAIN DIODE SWITCH
INTERCONNECT DIAGRAM
025-1178-002
IFR INC. WICHITA KANSAS
INTERCONNECT DIAGRAM EFFECTIVE S/N 109-120

Fig. 8-1-2



This drawing incorporates
the latest revision
as of Dec. '85 printing.

Fig. 8-1-3

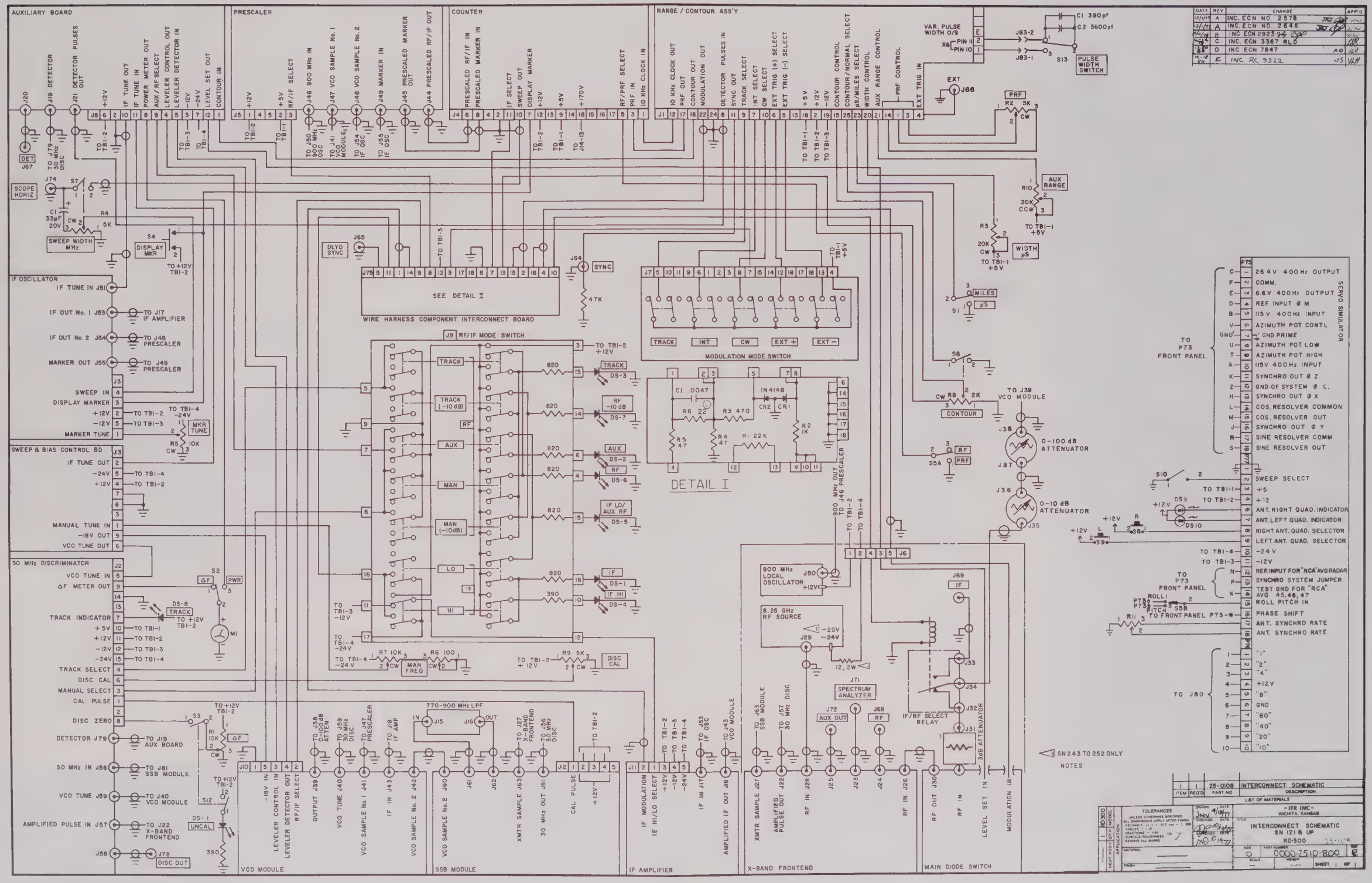
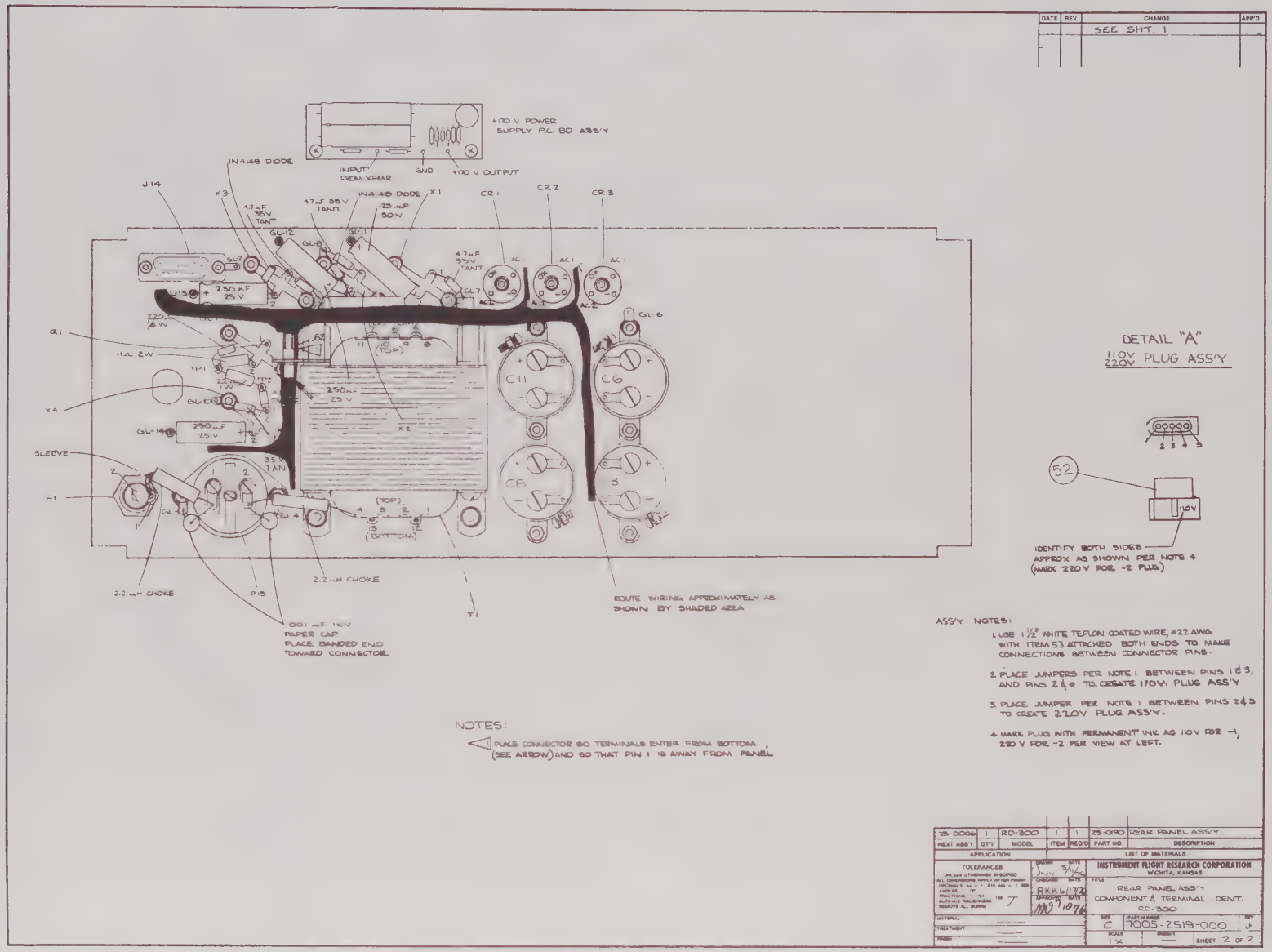
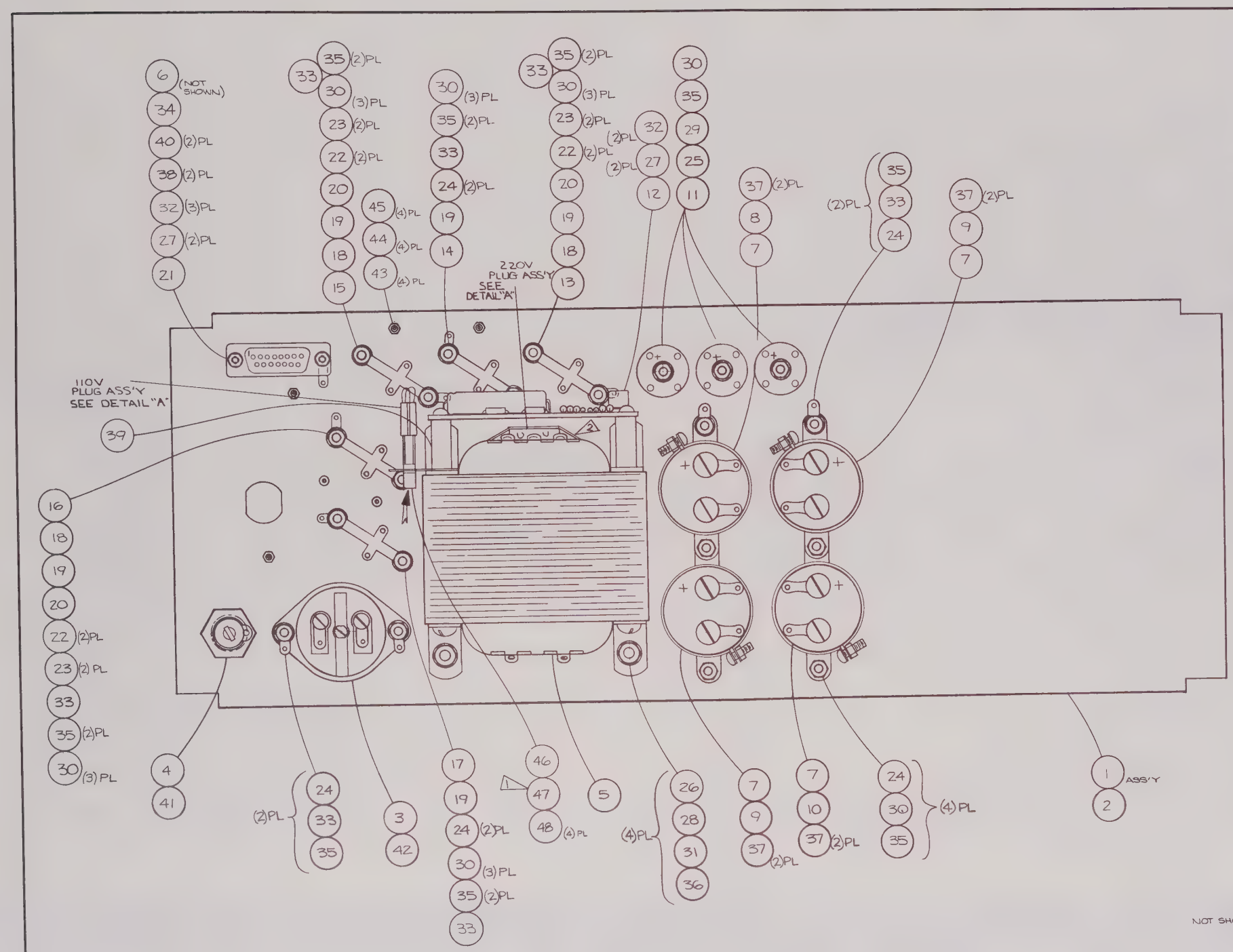

AUXILIARY BOARD
PRESCALER
COUNTER
RANGE / CONTOUR ASS'Y
IF OSCILLATOR
SWEEP & BIAS CONTROL BD
30 MHz DISCRIMINATOR
WIRE HARNESS COMPONENT INTERCONNECT BOARD
SEE DETAIL I
DETAIL I
J9 RF/IF MODE SWITCH
MODULATION MODE SWITCH
VAR. PULSE WIDTH O/S
PULSE WIDTH SWITCH
SCOPE HORIZ
SWEEP WIDTH MHz
DISPLAY MKR
AUX RANGE
WIDTH µS
CONTOUR
770-900 MHz LPF
900 MHz LOCAL OSCILLATOR
8.25 GHz RF SOURCE
SPECTRUM ANALYZER
IF/RF SELECT RELAY
0-100 dB ATTENUATOR
0-10 dB ATTENUATOR
SERVO SIMULATOR
SWEEP SELECT
ANT. RIGHT QUAD. INDICATOR
ANT. LEFT QUAD. INDICATOR
RIGHT ANT. QUAD. SELECTOR
LEFT ANT. QUAD. SELECTOR
REF. INPUT FOR "RCA" AVG RADAR
SYNCHRO SYSTEM JUMPER
TEST GND FOR "RCA" AVQ 45,46,47
ROLL PITCH IN
PHASE SHIFT
ANT. SYNCHRO RATE
ANT. SYNCHRO RATE
SN 243 TO 252 ONLY
NOTES:
VCO MODULE
SSB MODULE
IF AMPLIFIER
X-BAND FRONTEND
MAIN DIODE SWITCH
INTERCONNECT SCHEMATIC
SN 121 & UP
RO-300
0000-7510-800
- IFR INC -
WICHITA, KANSAS

Fig. 8-1-4



DATE
REV
CHANGE
APP'D
SEE SHT. 1
+170 V POWER SUPPLY P.C. BD ASS'Y
INPUT FROM XFMR
GND
+170 V OUTPUT
IN4148 DIODE
J14
X3
X1
CR1
CR2
CR3
Q1
X4
SLEEVE
F1
C11
C6
C8
2.2 uH CHOKE
P15
T1
.001 uF 1KV PAPER CAP PLACE BANDED END TOWARD CONNECTOR
ROUTE WIRING APPROXIMATELY AS SHOWN BY SHADED AREA
DETAIL "A"
110V 220V PLUG ASS'Y
52
110V
IDENTIFY BOTH SIDES APPROX AS SHOWN PER NOTE 4 (MARK 220V FOR -2 PLUG)
ASS'Y NOTES:
1. USE 1 1/2" WHITE TEFLON COATED WIRE, #22 AWG WITH ITEM 53 ATTACHED BOTH ENDS TO MAKE CONNECTIONS BETWEEN CONNECTOR PINS.
2. PLACE JUMPERS PER NOTE 1 BETWEEN PINS 1 & 3, AND PINS 2 & 4 TO CREATE 110V PLUG ASS'Y
3. PLACE JUMPER PER NOTE 1 BETWEEN PINS 2 & 3 TO CREATE 220V PLUG ASS'Y.
4. MARK PLUG WITH PERMANENT INK AS 110V FOR -1, 220 V FOR -2 PER VIEW AT LEFT.
NOTES:
PLACE CONNECTOR SO TERMINALS ENTER FROM BOTTOM (SEE ARROW) AND SO THAT PIN 1 IS AWAY FROM PANEL
25-0006 | 1 | RD-300 | 1 | 1 | 25-0190 | REAR PANEL ASS'Y
NEXT ASS'Y | QTY | MODEL | ITEM | REQ'D | PART NO | DESCRIPTION
APPLICATION
LIST OF MATERIALS
TOLERANCES
INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS
TITLE
REAR PANEL ASS'Y
COMPONENT & TERMINAL DENT.
RD-300
SIZE C
PART NUMBER 7005-2519-000
REV J
SCALE 1X
SHEET 2 OF 2

Fig. 8-2-1



NOTES:

1. PLACE CONNECTOR SO TERMINALS ENTER FROM BOTTOM (SEE ARROW) AND SO THAT PIN 1 IS AWAY FROM PANEL.
2. ATTACH 220V PLUG ASS'Y TO TRANSFORMER WINDINGS AS SHOWN.

DATE	REV	CHANGE	APP'D
7-13-76	A	INCORP. ECN# 1552, 1535 WW & KK	
7/15/77	B	INCORP ECN # 1891 JNV RKK	
9-9-78	D	INC ECN 2749, ADVANCED REV TO AGREE WITH P/L JRS	
2-9-79	E	INC. ECN # 3329 RLD	
5-18-79	F	INC. ECN # 3361 RLD	
11-16-79	G	UPDATED REV. LETTER. 3313 RLD	
4-30-80	H	INC ECN 3477 RLD	
11/4/82	J	INC ECN 5638 NJP	
5/8/85	K	INC AC W20	VLH
10/28/85	L	INC ECN 7961 DAH	VLH
4/4/86	M	INC ECN 8474 WAW	VLH
11-6-86	N	INC ECN 8891 "CHIPS"	VLH
11-25-87	R	INC ECN 9165 "CHIPS"	VLH
8-13-89	T	INC ECN 9843 JS	VLH

SEE C-BOM

ITEM	REQ'D	PART NO.	DESCRIPTION
53	6	02-06-2132	"MOLEX"/EQUIV. CRIMP TERM.
52	2	03-06-2055	"MOLEX"/EQUIV. PLUG
51			
50			
49			
48	4	02-06-1132	"MOLEX"/EQUIV CRIMP TERM.
47	1	03-04-1055	"MOLEX"/EQUIV (5) PIN CONN
46	1	25-0250	CONN. MOUNTING BRACKET
45	4	#2-56	LARGE PATTERN HEX NUT
44	4	#2	INT TOOTH LOCKWASHER
43	4	129-5002	"SEALECTRO"/EQUIV. GROUND TERM.
42	2	1488-4	"H H SMITH"/EQUIV #4 GND LUG
41	1	MDL-1	"BUSS"/EQUIV. 1 AMP FUSE
40	2	76-0013-1	SHELL NUT
39	2	76-0001-66	STANDOFF
38	2	76-0001-21	STANDOFF
37	8	1410-10	"H H SMITH"/EQUIV #10 GND LUG
36	4	#8-32	LARGE PATTERN HEX NUT
35	21	#6-32	SMALL PATTERN HEX NUT
34	1	1410-4	"H H SMITH"/EQUIV #4 GND LUG
33	9	1410-6	"H H SMITH"/EQUIV #6 GND LUG
32	5	#4	INT. TOOTH LOCKWASHER
31	3	#8	INT. TOOTH LOCKWASHER
30	18	#6	INT. TOOTH LOCKWASHER
29	3	#6	FLAT WASHER
28	4	#8	FLAT WASHER
27	4	#4-40 X 1/4	PBHMS
26	4	#8-32 X 3/16	PBHMS
25	3	#6-32 X 3/16	PBHMS
24	12	#6-32 X 5/16	PBHMS
23	6	#6-32 X 1/2	PBHMS
22	6	76-0108	STANDOFF
21	1	205205-1	"AMP"/EQUIV (15) PIN FEMALE CONN.
20	3	KA22-A	"RCA"/EQUIV INSULATOR
19	5	DT1-1	"MICRO PLASTICS"/EQUIV. MOUNT
18	3	PTC-103-IN	"MICRO PLASTICS"/EQUIV SHIELD
17	1	LAS-1505	"LAMBDA"/EQUIV +5V REG.
16	1	2N4398	"NAT'L" EQUIV. XSTR
15	1	LAS-1512	"LAMBDA"/EQUIV. -12V. REG.
14	1	LAS-1512	"LAMBDA"/EQUIV +12V REG.
13	1	LAS-1824	"LAMBDA"/EQUIV. -12V. REG.
12	1	00-0160	170VDC POWER SUPPLY ASS'Y
11	3	PK-10	"ELECTRONIC DEVICE"/EQUIV. RECT'R.
10	1	91A440 MA292	"STN"/EQUIV. 2900 MF 40V CAP
9	2	CGS222U050B3C5	"MALLORY"/EQUIV. 2200 MF 40V CAP
8	1		12000 MF 18V CAP
7	4	VR-3	"MALLORY"/EQUIV CAP. CLAMP
6	10	66504-3	"AMP"/EQUIV CRIMP TERM.
5	1	76-0120	"NAT'L XFMR"/EQUIV. XFMR
4	1	HKP	"BUSS"/EQUIV. FUSE HOLDER
3	1	180-5	"AMPHENOL"/EQUIV. AC PLUG
2	1	25-0003	REAR PANEL
1	1	25-0190	REAR PANEL ASS'Y

NOT MAINTAINED

25-0190	1	RD-300
NEXT ASS'Y	QTY	MODEL

APPLICATION — LIST OF MATERIALS

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS .XX ± .010 .XXX ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64 125
SURFACE ROUGHNESS
REMOVE ALL BURRS

DRAWN JNV 5-5-76
CHECKED 5-6-76
APPROVED 5-7-76

MATERIAL SEE L/M ABOVE
TREATMENT
FINISH

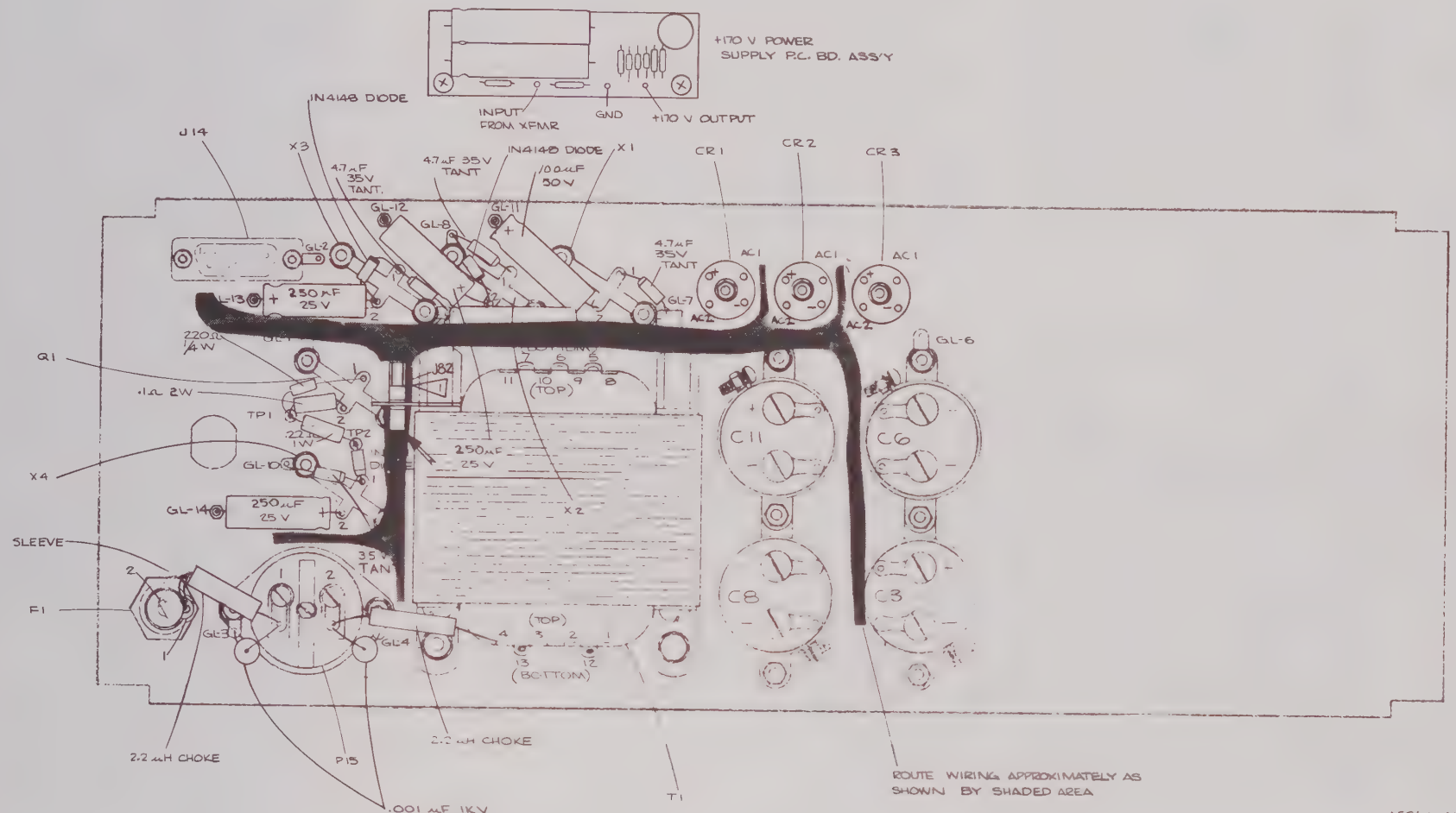
INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS.

TITLE
REAR PANEL
ASSEMBLY DRAWING
RD-300

SIZE C | PART NUMBER 7005-2519-000 | REV T
SCALE 1X | WEIGHT — | SHEET 1 OF 2

Fig. 8-2-2

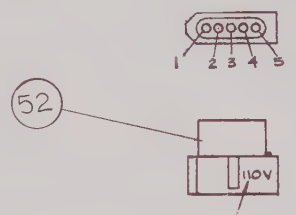
DATE	REV	CHANGE	APP'D
		SEE SHT. 1	



NOTES:

1. PLACE CONNECTOR SO TERMINALS ENTER FROM BOTTOM (SEE ARROW) AND SO THAT PIN 1 IS AWAY FROM PANEL.

DETAIL "A"
110V 220V PLUG ASS'Y



ASS'Y NOTES:

1. USE 1 ½" WHITE TEFLON COATED WIRE, #22 AWG WITH ITEM 53 ATTACHED BOTH ENDS TO MAKE CONNECTIONS BETWEEN CONNECTOR PINS.
2. PLACE JUMPERS PER NOTE 1 BETWEEN PINS 1 & 3, AND PINS 2 & 4 TO CREATE 110V PLUG ASS'Y
3. PLACE JUMPER PER NOTE 1 BETWEEN PINS 2 & 3 TO CREATE 220V PLUG ASS'Y.
4. MARK PLUG WITH PERMANENT INK AS 110V FOR -1, 220 V FOR -2 PER VIEW AT LEFT.

25-0006	1	RD-300	1	1	25-090	REAR PANEL ASS'Y
NEXT ASS'Y	QTY	MODEL	ITEM	REQ'D	PART NO.	DESCRIPTION

APPLICATION — LIST OF MATERIALS

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS .xx = ± .010 .xxx = ± .005
ANGLES ± 1/2°
FRACTIONS: ± 1/64
SURFACE ROUGHNESS 125 ✓
REMOVE ALL BURRS

DRAWN JJV DATE 5/11/76
CHECKED RKK 6/17/76 DATE
APPROVED MM 9/10/76 DATE

MATERIAL
TREATMENT
FINISH

INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS.

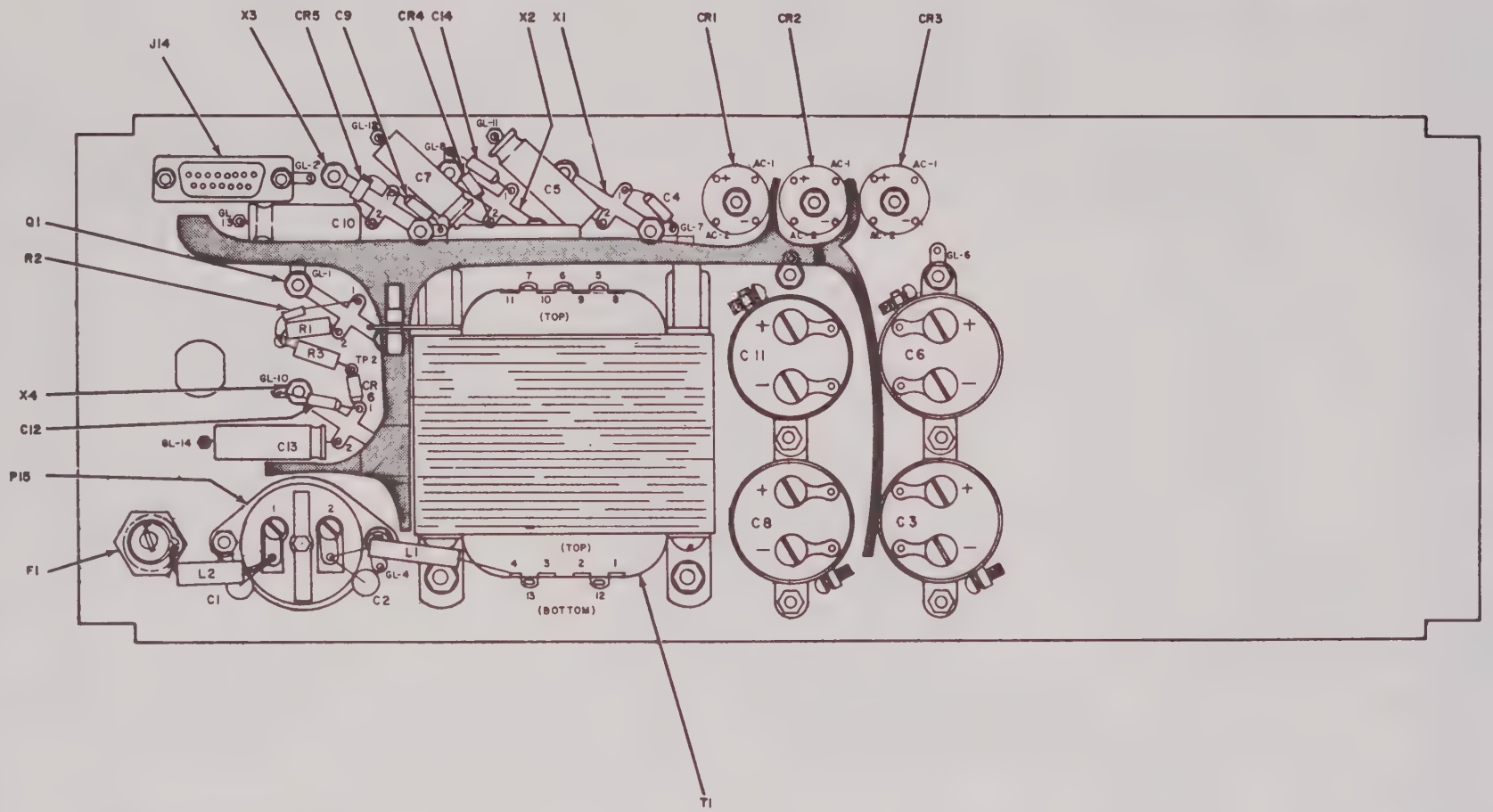
TITLE
REAR PANEL ASS'Y
COMPONENT & TERMINAL IDENT.
RD-300

SIZE	PART NUMBER	REV
C	1005-2519-000	AF

SCALE 1X — WEIGHT — SHEET 2 OF 2

Fig. 8-2-3

DATE	REV	CHANGE	APP'D



ITEM	REQ'D	PART NO.	DESCRIPTION
		LIST OF MATERIALS	

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS .xx ± .010 .xxx ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125 ✓
REMOVE ALL BURRS

DRAWN TenEyck 9-7-
CHECKED
APPROVED

- IFR INC -
WICHITA, KANSAS

TITLE
REAR PANEL ASSEMBLY
COMPONENT & TERMINAL IDENT.

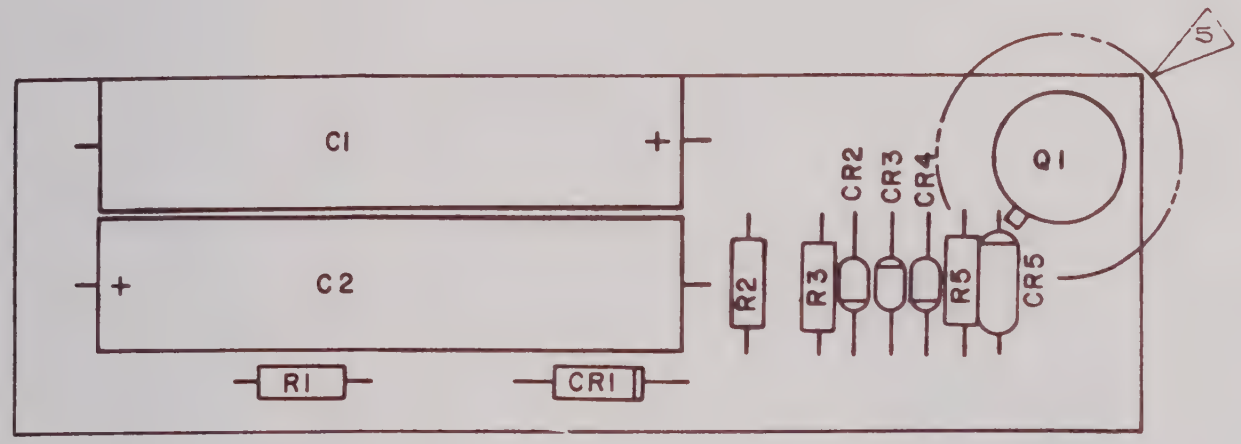
MATERIAL
FINISH

SIZE C | ASSY NUMBER 025-1178-003 | REV D
SCALE | WEIGHT | SHEET | OF

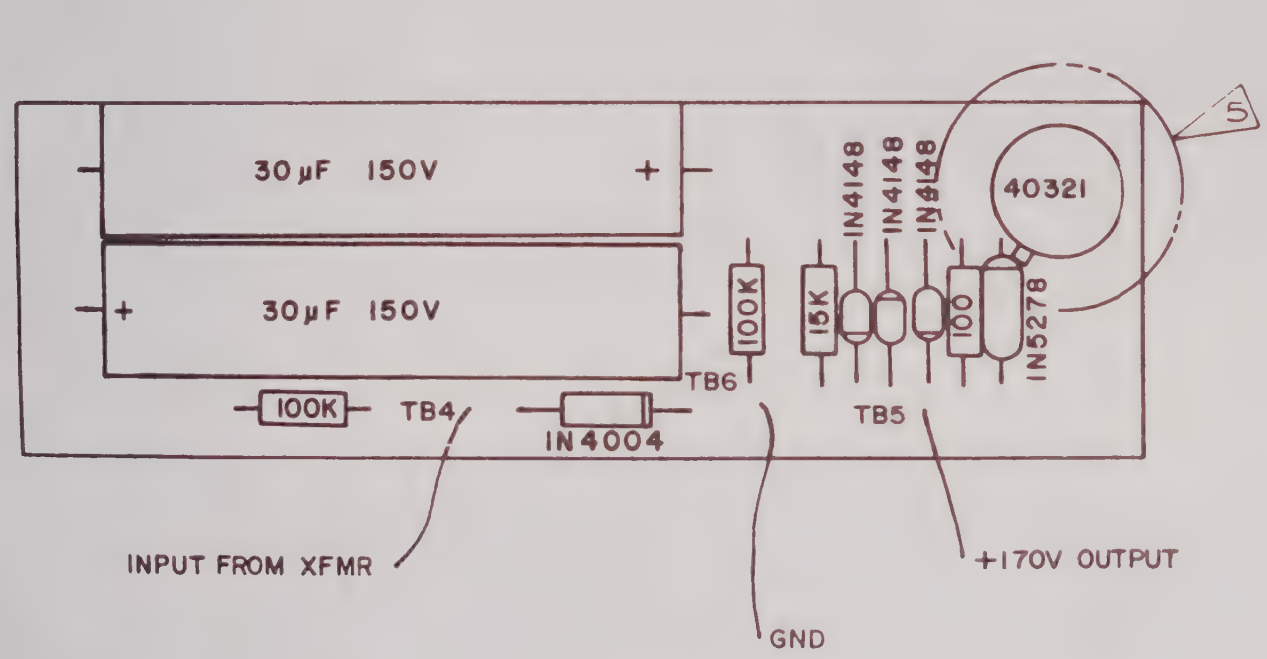
25-006 | 1 | RD-300
NEXT ASS'Y | QTY | MODEL
APPLICATION

Fig. 8-2

DATE	REV	CHANGE	APP'D
8/16/76	A	INC ECN 1640/1642 RKK	
4/24/78	A1	INC ECN 2936 JJ 008	



NOTES:
1. ALL RESISTORS ARE ¼ W, 10% TOLERANCE EXCEPT AS NOTED.
2. ALL CAPACITOR VALUES ARE IN µF EXCEPT AS NOTED.
3. COMPONENT LEADS MAY EXTEND .04 to .06 BEYOND BOTTOM OF BOARD AFTER SOLDERING.
4. MAXIMUM HEIGHT OF COMPONENTS TO BE .35 FROM COMPONENT SIDE OF BOARD.
5. MOUNT TRANSISTOR ON "BIVAR"/EQUIV #605-085 MOUNTING PAD AND COVER WITH "KAPLUG"/EQUIV #BPF CAP.
6. PC BOARD IS PLATED (1) SIDE ONLY AND COMPONENTS ARE MOUNTED ON NONPLATED SIDE ONLY.



16-0051	1	NAV-750, A, B				
25-0190	1	RD-300	1	1	00-0160	PC BOARD ASS'Y
NEXT ASS'Y	QT'Y	MODEL	ITEM	REQ'D	PART NO.	DESCRIPTION
APPLICATION			LIST OF MATERIALS			

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: ± .005
ANGLES: ± 1/2°
FRACTIONS: ± 1/64
SURFACE ROUGHNESS 125 √
REMOVE ALL BURRS

DRAWN NV DATE 2-2-77
CHECKED RKK DATE 2/8/77
APPROVED DATE 2-10-77

MATERIAL —
TREATMENT —
FINISH

INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS

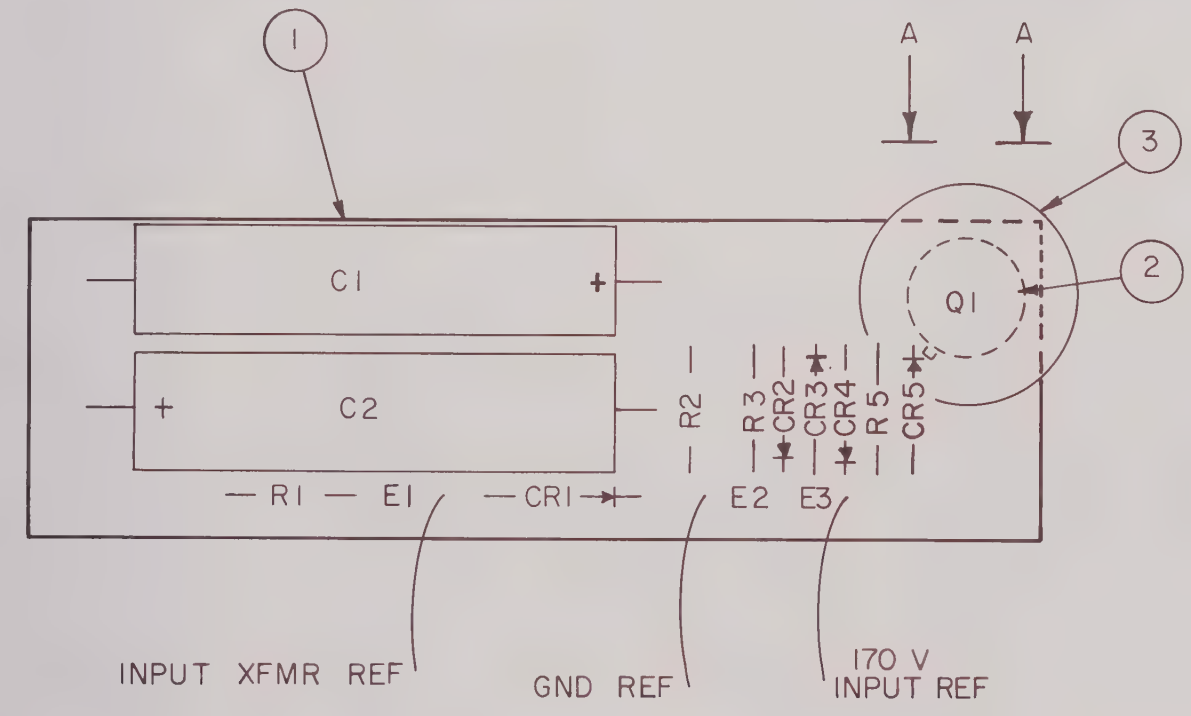
TITLE
170 VDC POWER SUPPLY
PC BOARD ASS'Y

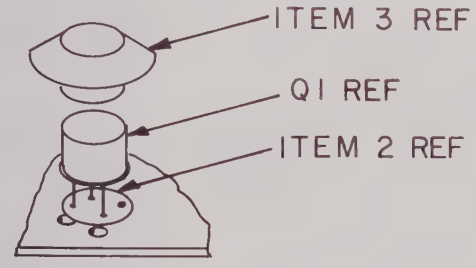
SIZE	PART NUMBER	REV
B	2-00-0160	A1

SCALE	WEIGHT	SHEET
2X	—	1 OF 1

Fig. 8-3

DATE	REV	CHANGE	APVD
10/16/86	D	REDRAWN PER RC 9010 DAH	
4-13-87	E	INC RC 9744 RB	VLH





VIEW A–A
NO SCALE

NOTES:

1. COMPONENT LEADS MAY EXTEND .04 TO .06 BEYOND THE BOTTOM OF THE BOARD AFTER SOLDERING.
2. MAXIMUM HEIGHT OF COMPONENTS TO BE .35 FROM COMPONENT SIDE OF BOARD.
3. MOUNT Q1 ON MOUNTING PAD(ITEM 2) AND COVER WITH CAP (ITEM 3).
4. PC BOARD IS PLATED ON ONE SIDE ONLY & COMPONENTS ARE MOUNTED ON THE NON-PLATED SIDE ONLY.

TOLERANCES: (UNLESS OTHERWISE SPECIFIED)
ALL DIMENSIONS APPLY AFTER FINISH
TOLERANCES: DECIMALS: .xx ± .xxx ± ANGLES: ±
SURFACE FINISH: REMOVE ALL BURRS

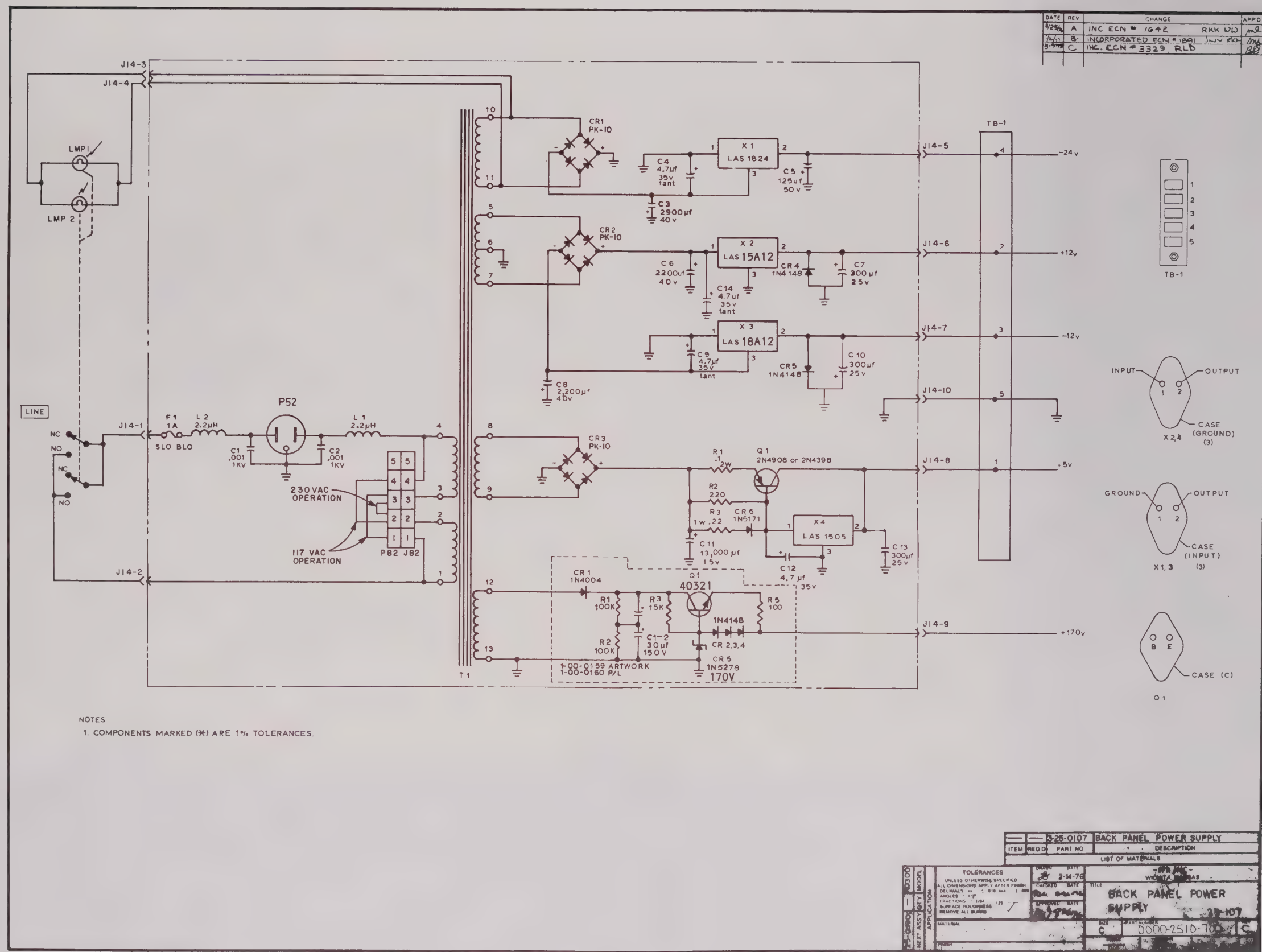
MATERIAL

FINISH

IFR SYSTEMS INC
10200 West York St., Wichita, Kansas 67215

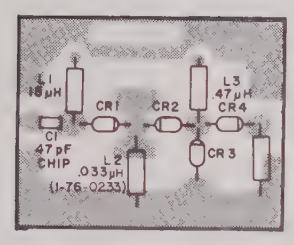
DRAWN JNV	DATE 2/2/77	TITLE PC BOARD ASS'Y 170 VDC POWER SUPPLY (E)	
CHECKED RKK	DATE 2/8/77		
APPROVED MD	DATE 2/10/77	SIZE B	DWG. NO. 7010-0016-000 REV E
		SCALE: OR AS NOTED 2:1	DO NOT SCALE THIS DRAWING FSCM CODE 51190 SHEET 1 OF 1

Fig. 8-3-1

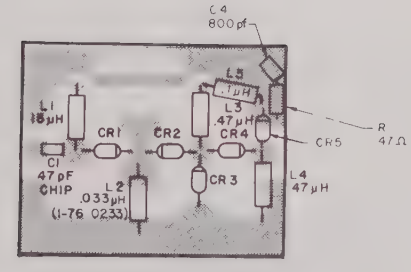


DATE REV CHANGE APP'D
8/25/76 A INC ECN # 1642 RKK WD
7/6/77 B INCORPORATED ECN # 1891 JWV RKK
8-5-79 C INC. ECN # 3329 RLD
J14-3
J14-4
LMP1
LMP 2
LINE
NC
NO
J14-1
F1 1A SLO BLO
L2 2.2μH
C1 .001 1KV
P52
C2 .001 1KV
L1 2.2μH
230 VAC OPERATION
117 VAC OPERATION
P82 J82
J14-2
T1
CR1 PK-10
CR2 PK-10
CR3 PK-10
C4 4.7μf 35v tant
C3 2900μf 40v
X1 LAS 1824
C5 125uf 50v
C6 2200uf 40v
C14 4.7uf 35v tant
X2 LAS 15A12
CR4 1N4148
C7 300μf 25v
C9 4.7μf 35v tant
X3 LAS 18A12
CR5 1N4148
C10 300μf 25v
C8 2,200μf 40v
R1 .1 2W
Q1 2N4908 or 2N4398
R2 220
R3 1w .22
CR6 1N5171
C11 13,000μf 15v
X4 LAS 1505
C12 4.7μf 35v
C13 300μf 25v
CR1 1N4004
R1 100K
R2 100K
R3 15K
C1-2 30μf 150V
Q1 40321
1N4148
CR 2,3,4
R5 100
CR5 1N5278 170V
1-00-0159 ARTWORK
1-00-0160 P/L
J14-5
J14-6
J14-7
J14-10
J14-8
J14-9
TB-1
-24v
+12v
-12v
+5v
+170v
INPUT
OUTPUT
CASE (GROUND) (3)
X2,4
GROUND
OUTPUT
CASE (INPUT) (3)
X1,3
B E
CASE (C)
Q1
NOTES
1. COMPONENTS MARKED (*) ARE 1% TOLERANCES.
3-25-0107 BACK PANEL POWER SUPPLY
ITEM REQ'D PART NO DESCRIPTION
LIST OF MATERIALS
TOLERANCES
2-14-76
BACK PANEL POWER SUPPLY
0000-2510-700

Fig. 8-4

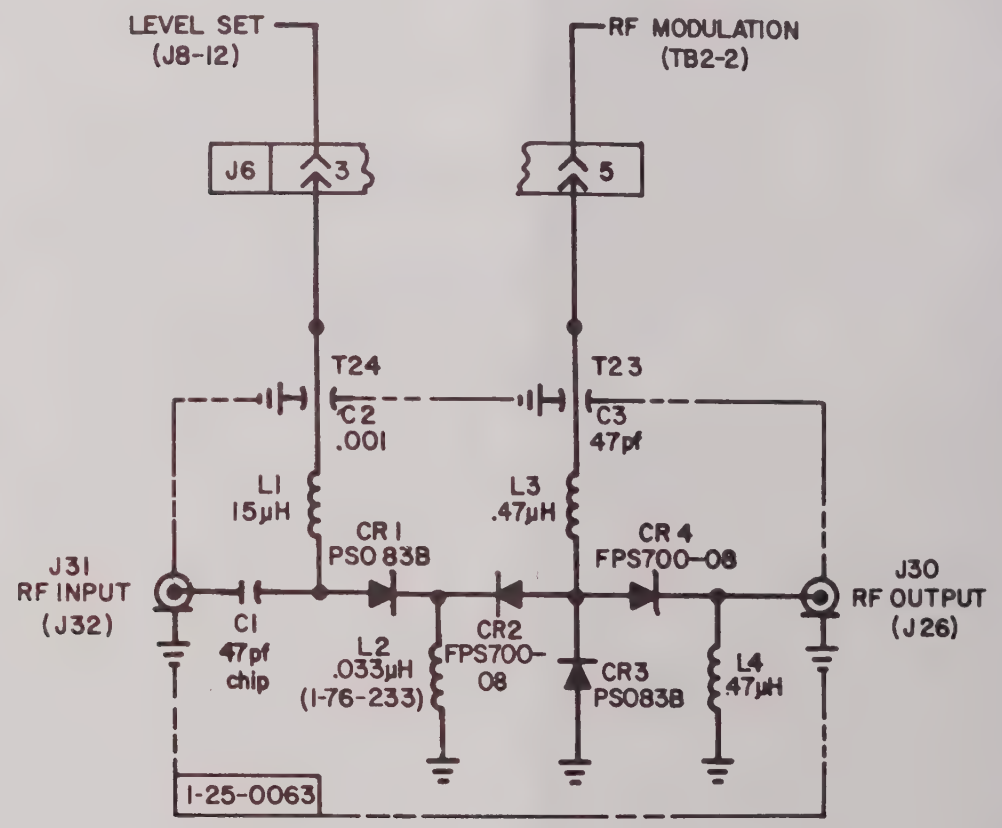


EFFECTIVE S/N THRU 269



EFFECTIVE S/N 270 AND ON

Fig. 8-5 MAIN DIODE SWITCH BOARD PARTS LAYOUT

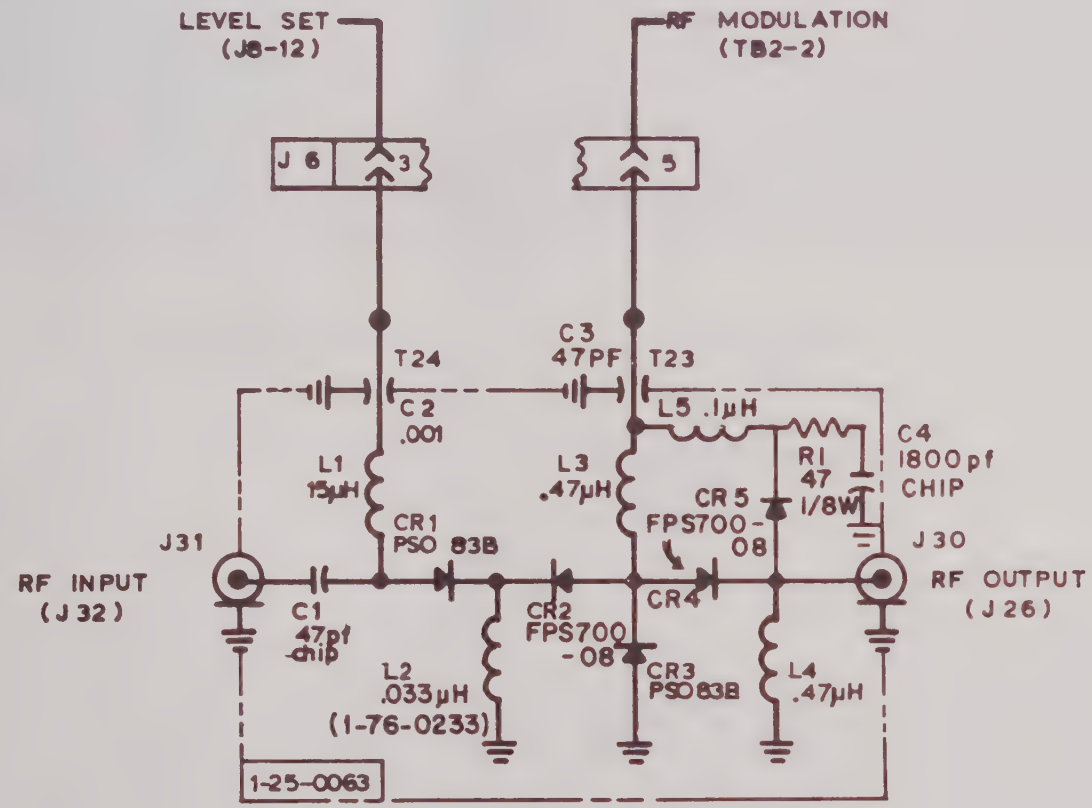


NOTE

CR2 AND CR4 CHANGED
FROM PSO-838 DIODES
S/N 223 & ON.

FIG. 8-6-1
MAIN DIODE SWITCH
EFF: TO S/N 269

DATE	REV	CHANGE	APP'D
9/6/77	A	INCORP. ECN # 2335 LC	
1-16-78	B	INC ECN 2713	WW
4-5-78	C	INC ECN 2903	WW



EFFECTIVE S/N 269 & ON

ITEM	REQ'D	PART NO.	DESCRIPTION
1	1	25-0115	MAIN DIODE SWITCH

LIST OF MATERIALS

25-0181	1	RD300	
NEXT ASS'Y	QTY	MODEL	

APPLICATION

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: xx = ± .010 xxx = ± .005
ANGLES: ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125 J
REMOVE ALL BURRS

DRAWN DATE 2-11-76
CHECKED DATE 2/11/76
APPROVED DATE 3/16/78

-IFR INC-
WICHITA, KANSAS

TITLE
MAIN DIODE SWITCH
(RD-300)

MATERIAL
FINISH

SIZE B | PART NUMBER 2-25-0115 | REV C
SCALE | WEIGHT | SHEET 1 OF 2

Fig. 8-6-2

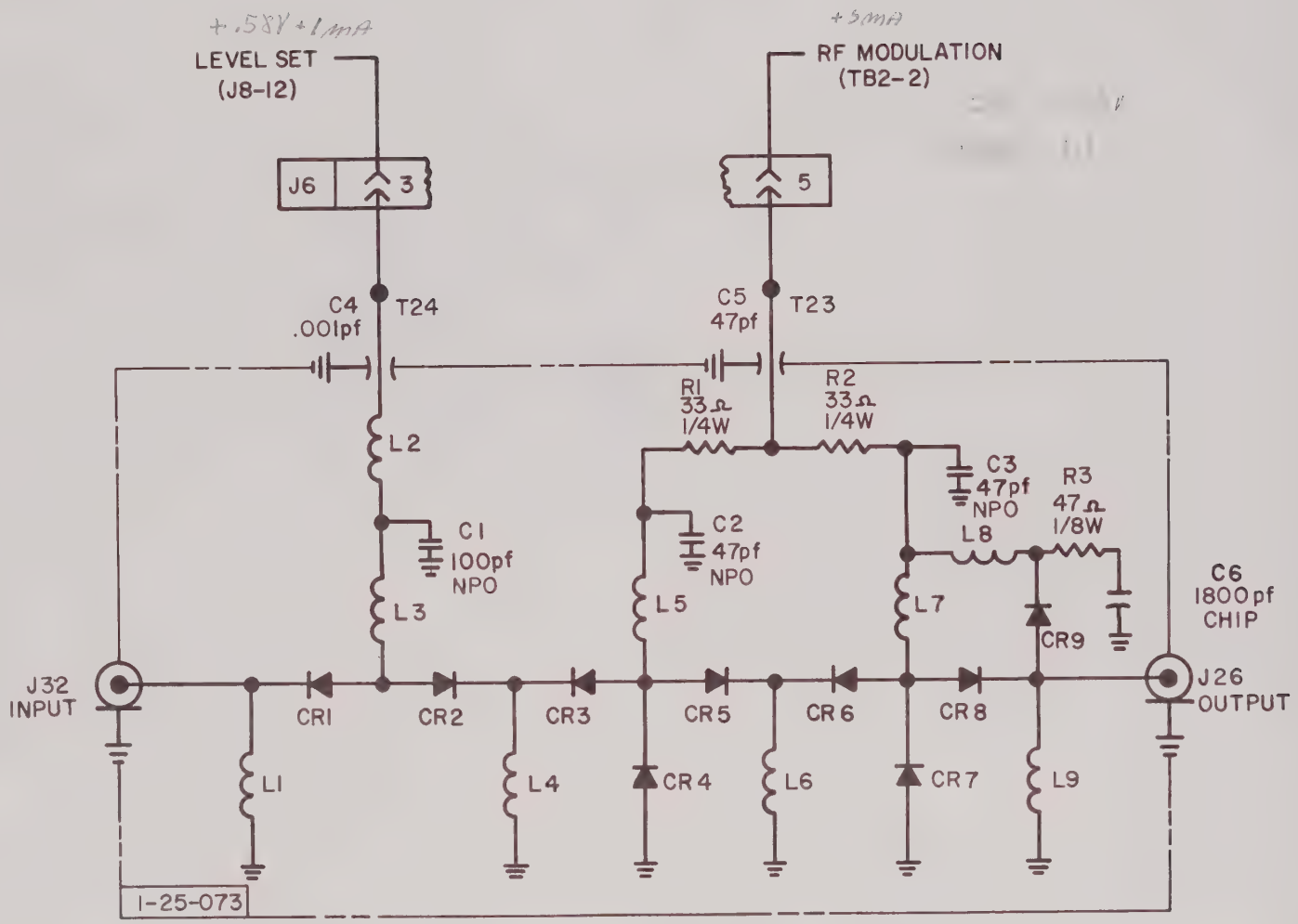


Fig. 8-6-3 MAIN DIODE SWITCH

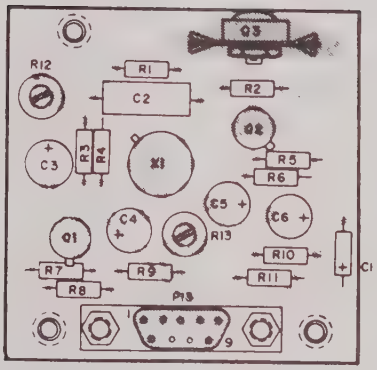
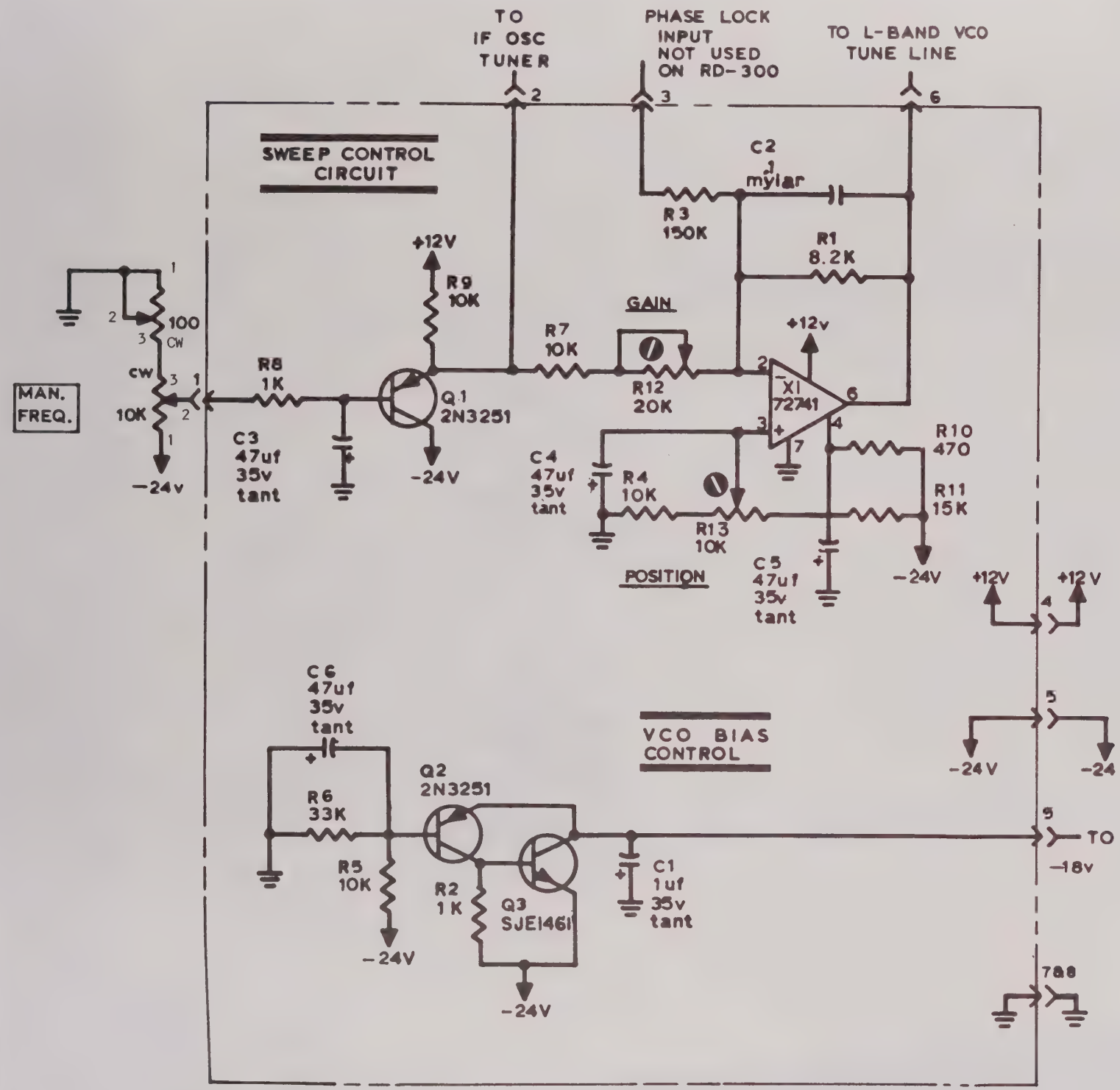


Fig. 8-7 SWEEP & BIAS CONTROL BOARD PARTS LAYOUT

8-13/8-14 Blank

DATE	REV	CHANGE	APP'D
3-5-76	A	INC ECN 2805 JAJ WW	WW



INSTRUMENT FLIGHT RESEARCH CORP. 4053 Navajo Lane Wichita, Ks.	DWN DATE B 10-14-75	
	CHKD DATE JS. 10-14-75	
SWEEP & BIAS CONTL CKT'S.	APP DATE [illegible]	
PART NO 2-25-0118	REV A DATE 3-18-76	DWN APP [illegible]
SCALE ——	MODEL RD-300	SHT. 1 of 2

Fig. 8-8

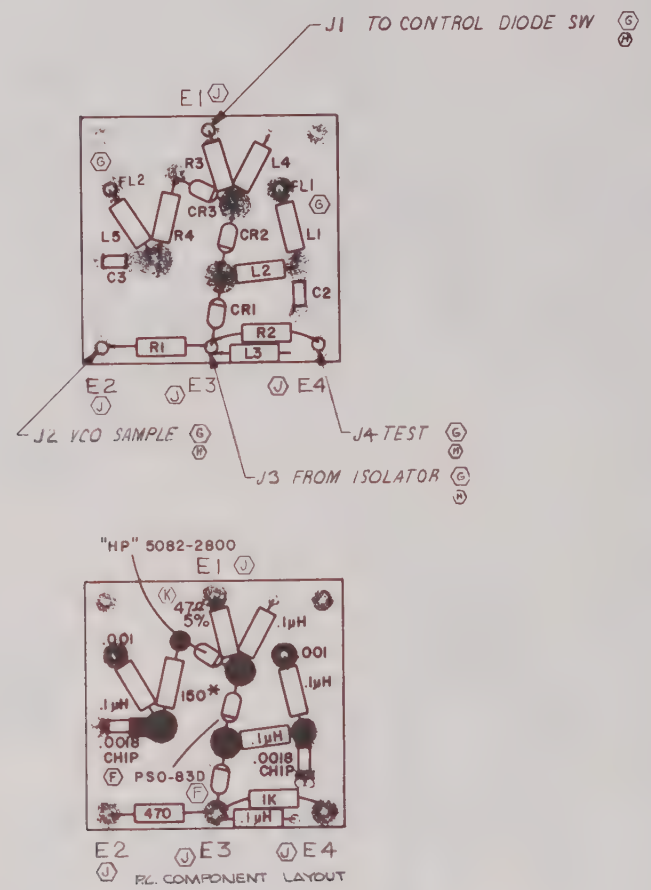
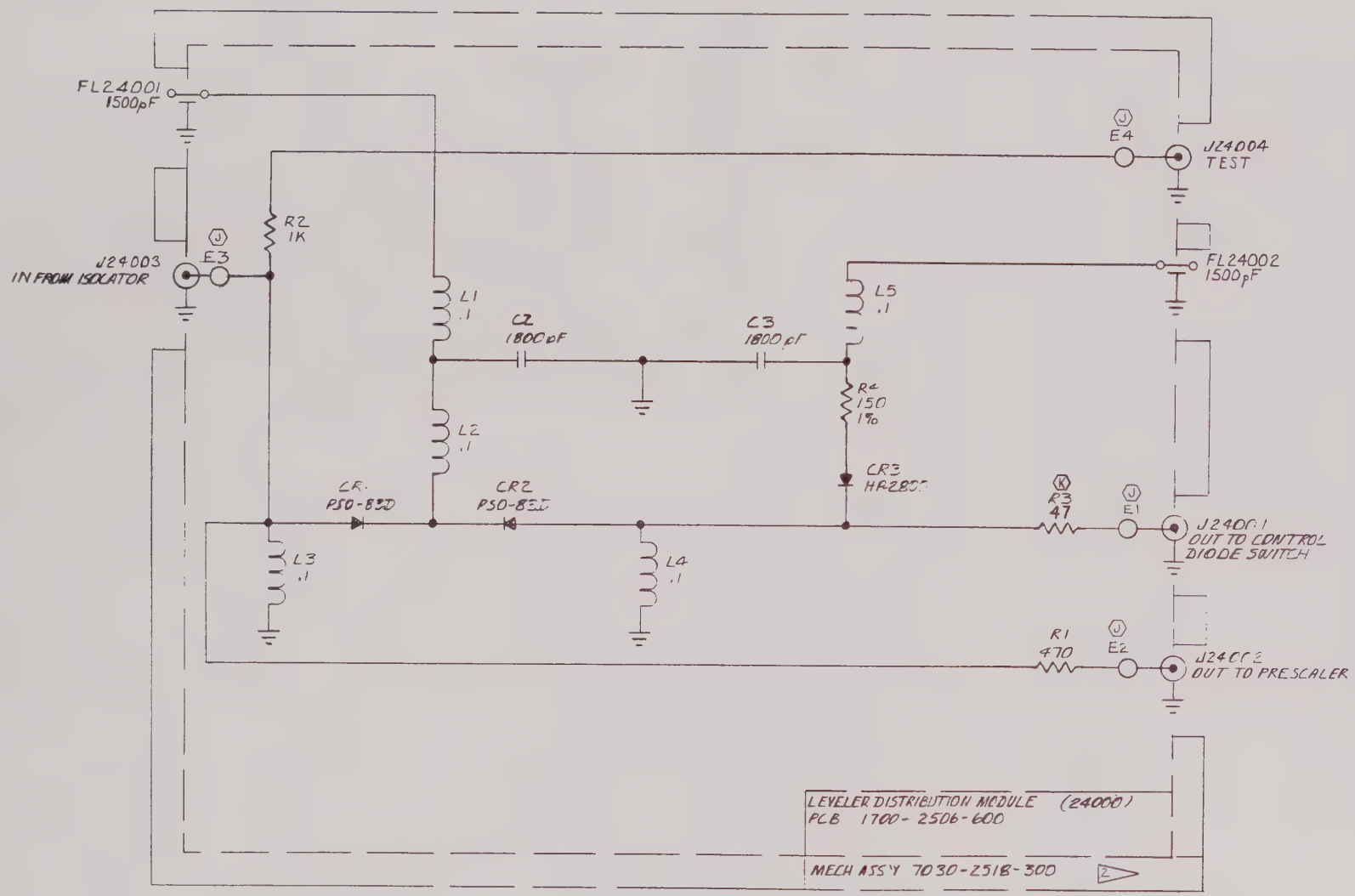


Fig. 8-9 LEVELER/DISTRIBUTION MODULE BOARD PARTS LAYOUT (7030-2518-300-K)

DATE	REV	CHANGE	APVD
12/6/85	H	REDRAWN PER RL 7953 DAH	
1-3-86	J	INC RC 8133 JS	
4-1-87	K	INC ECN 9519 RB	



STANDARDS:
(UNLESS OTHERWISE NOTED)

1. ALL REF NOS CARRY AN ASSIGNED DESIGNATOR SERIES. THIS SCHEMATIC CARRIES SERIES: 24000
   (E.G. R1 IS R24001, ETC.).
   A. MECH ASS'Y. 7030-2518-300
   B. PCB ASS'Y N/A
   C. PCB 1700-2506-600
   D.
2. ALL RESISTORS ARE ¼ W, ±5% TOLERANCE
3. ALL RESISTANCE IS EXPRESSED IN OHMS
4. ALL CAPACITANCE IS EXPRESSED IN MICRO FARADS.
5. ALL INDUCTANCE IS EXPRESSED IN MICRO HENRY'S.

NOTES:
1. LAST REF. NOS. USED:
   L5, R4, CR3, C4, J4, FL2

~~2 REF NOS NOT USED~~

2 REFER TO SCHEMATIC 0000-9910-500 FOR VCO MODULE INTERCONNECT.

DASH NO	REF DES SERIES	NEXT ASSY	MODEL
-000		7030-2518-800	RD-300
-000	24000	7005-4940-500	RD-301

APPLICATION

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH
TOLERANCES
DECIMALS .xx ± .xxx ±
FRACTIONS ±
ANGLES ±
SURFACE FINISH √
REMOVE ALL BURRS
DO NOT SCALE THIS DRAWING

MATERIAL

FINISH

-IFR INC- 10200 West York Street Wichita, Kansas 67215

DRAWN G. DANFORTH 8-2-85
CHECKED VLH 11-22-85
APPROVED 11-26-85

TITLE SCHEMATIC
LEVELER DISTRIBUTION MODULE
RD-301 (11-100)

SIZE C | DWG NO 0000-2511-100 | REV K

SCALE | CODE IDENT 51190 | WEIGHT | SHEET 1 OF 1

Fig. 8-9-1

VCO THEORY OF OPERATION

(RD-300)

2-25-121

1-1. Introduction.

1-2. The Voltage Controlled Oscillator (VCO) Module of the RD-300 provides a leveled and contoured L-Band frequency output from 1045 MHz and two VCO sample outputs. The L-Band outputs of the VCO oscillator are routed to the Prescaler Module (VCO sample #1), the Single Sideband Module (VCO sample #2) and to the Leveler/ Distribution Module (LEVELER DETECTOR OUTPUT).

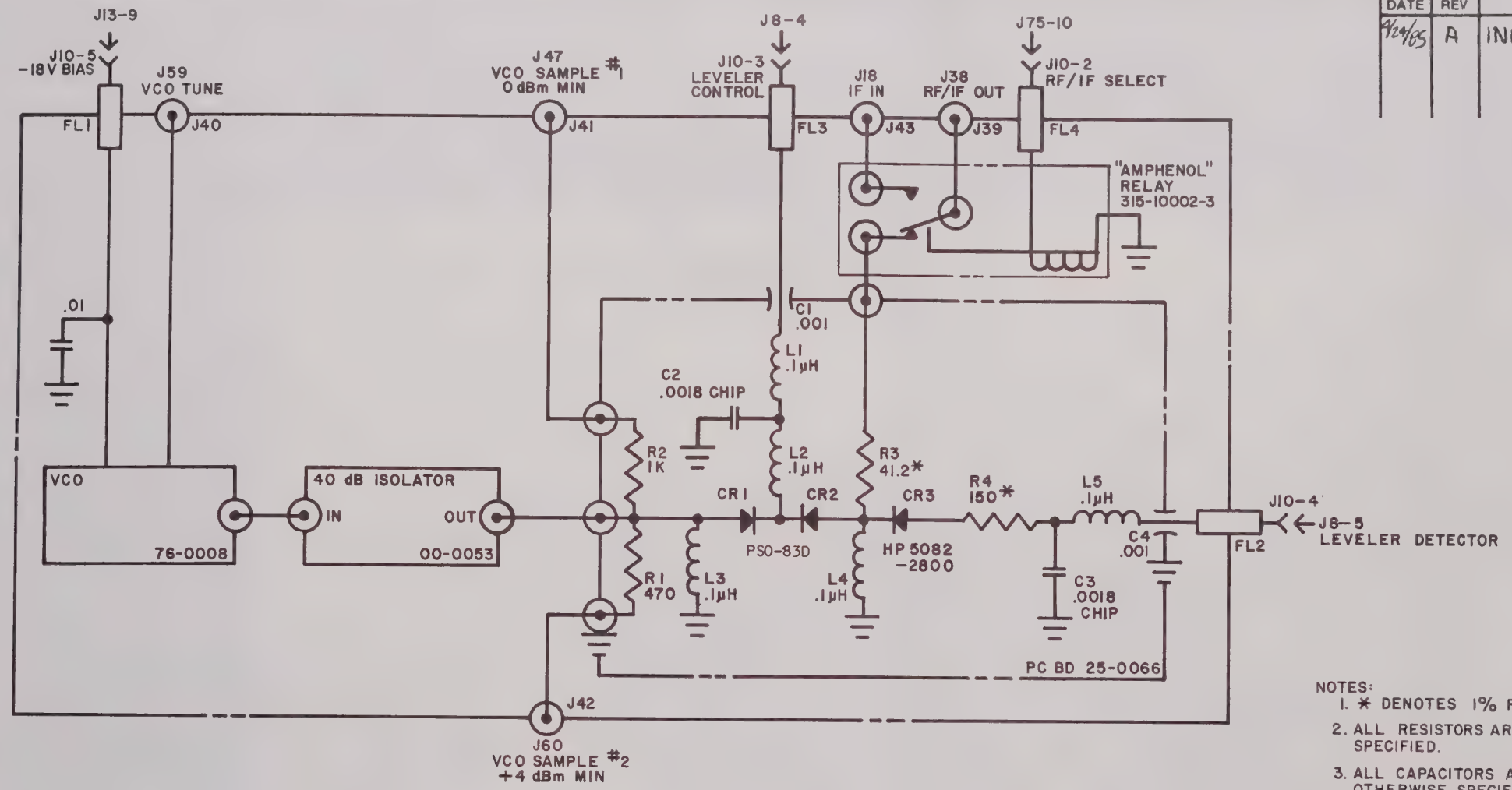
2-1. Operation.

2-2. The Voltage Controlled Oscillator (VCO) requires -18Vdc for operation. This voltage is regulated down from the -24Vdc supply on the Sweep and Bias Control Board. The +25 dBm output of the VCO is applied to the input of a 40 dB isolator. The insertion loss of 1 dB (nominal) allows for a 24 dBm output from the isolator.

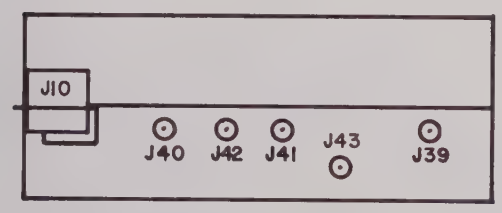
2-3. PIN diodes CR1 & CR2 (MA47047) and associated components function as variable attenuators and control the VCO signal level applied to the coax relay ("Amphenol" 315-10002-3) before being outputted on J39. CR1 & CR2 are controlled by a biasing signal on J10 pin 3 from the Auxiliary Board.

2-4. CR3 (HP5082) is used as a detector diode for the leveler control circuitry. The output of CR3 is applied to a network consisting of R4, C3 and L5. This network filters the RF output of C3 to a d.c. level which is the applied to the Auxiliary PC Board via the LEVELER DETECTOR OUTPUT J10 pin 4.

DATE	REV	CHANGE	APP'D
9/24/85	A	INC ECN 6837	TE



NOTES:
1. * DENOTES 1% RESISTOR TOLERANCE.
2. ALL RESISTORS ARE 1/4 W 10% UNLESS OTHERWISE SPECIFIED.
3. ALL CAPACITORS ARE SPECIFIED IN μF UNLESS OTHERWISE SPECIFIED.



VCO MODULE CONNECTOR ID.

ITEM	REQ'D	PART NO	DESCRIPTION
1	1	25-0121	VCO MODULE SCHEMATIC

LIST OF MATERIALS

MODEL	RD-300
QTY	1
APPLICATION	NEXT ASSY 25-0188

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: .xx = ± .010 .xxx = ± .005
ANGLES: ± 1/2°
FRACTIONS: ± 1/64
SURFACE ROUGHNESS 125 ✓
REMOVE ALL BURRS

DRAWN DATE: Jnv 1-24-77
CHECKED DATE: RKK 2/23/77
APPROVED DATE: RJM 2/23/77

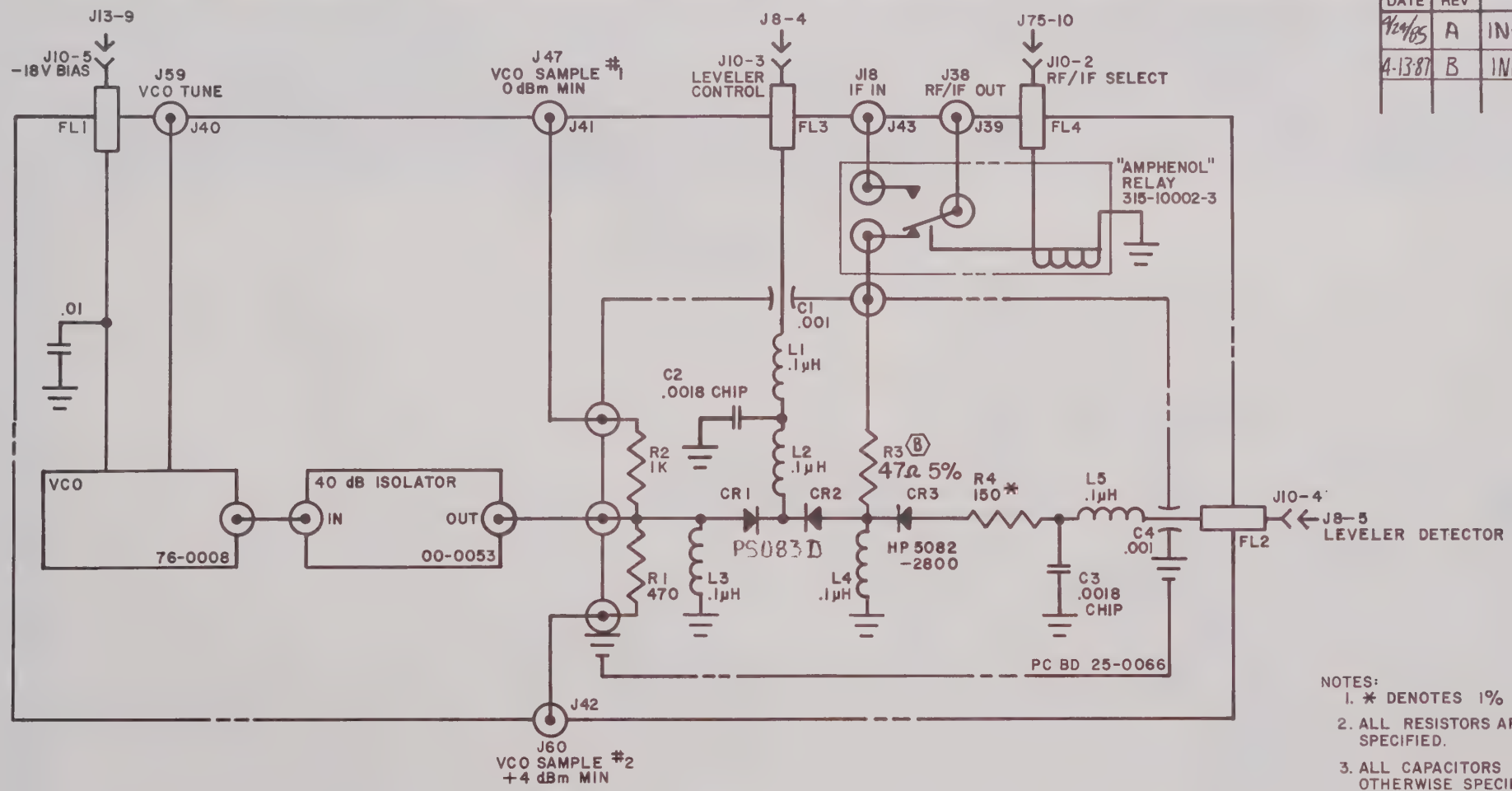
MATERIAL: —
FINISH: —

-IFR INC-
WICHITA, KANSAS

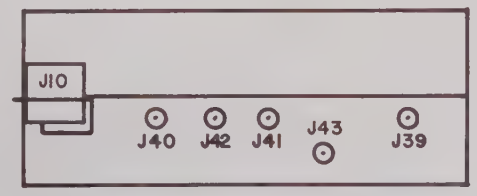
TITLE
SCHEMATIC
VCO MODULE
RD-300 25-121

SIZE: B
PART NUMBER: 0000-2512-100
REV: A
SCALE: NONE
WEIGHT: —
SHEET 1 OF 1

DATE	REV	CHANGE	APP'D
7/24/85	A	INC ECN 6837	TE
4-1387	B	INC ECN 9719 RB	VLH



NOTES:
1. * DENOTES 1% RESISTOR TOLERANCE.
2. ALL RESISTORS ARE 1/4 W 10% UNLESS OTHERWISE SPECIFIED.
3. ALL CAPACITORS ARE SPECIFIED IN μF UNLESS OTHERWISE SPECIFIED.



VCO MODULE CONNECTOR ID.

ITEM	REQ'D	PART NO	DESCRIPTION
1	1	25-0121	VCO MODULE SCHEMATIC

LIST OF MATERIALS

RD-300	MODEL	TOLERANCES UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH DECIMALS: .xx = ± .010 .xxx = ± .005 ANGLES: ± 1/2° FRACTIONS: ± 1/64 SURFACE ROUGHNESS 125 REMOVE ALL BURRS	DRAWN DATE Jnv 1-24-77 CHECKED DATE RKK 2/23/77 APPROVED DATE RJM 2/23/77
1	QTY		
25-0188	NEXT ASS'Y		
	APPLICATION	MATERIAL — FINISH —	

-IFR INC-
WICHITA, KANSAS

TITLE
SCHEMATIC
VCO MODULE
RD-300 25-121

SIZE	PART NUMBER	REV
B	0000-2512-100	B

SCALE	WEIGHT	SHEET
NONE	—	1 OF 1

Fig. 8-10-1

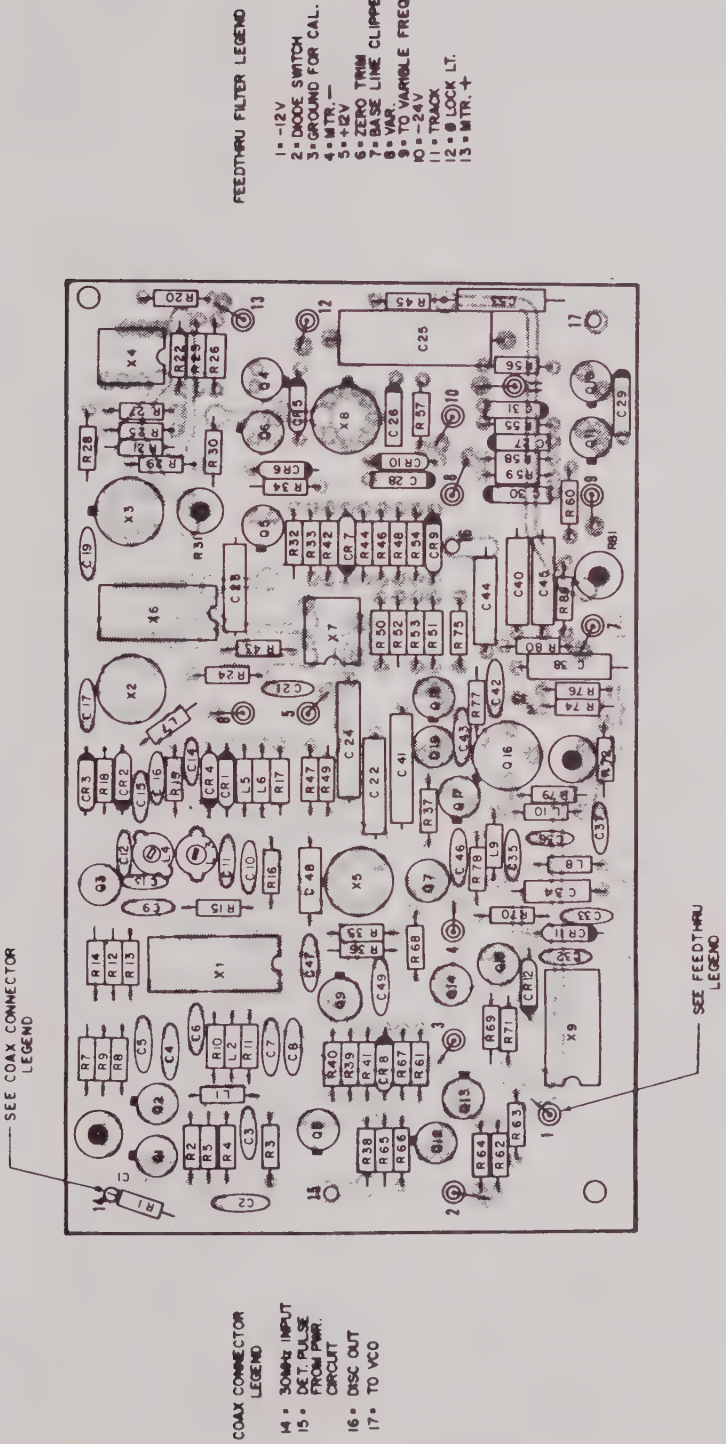


FIG. 8-11 30 MHz PULSE DISCRIMINATOR BOARD PARTS LAYOUT
EFFECTIVE TO S/N 109

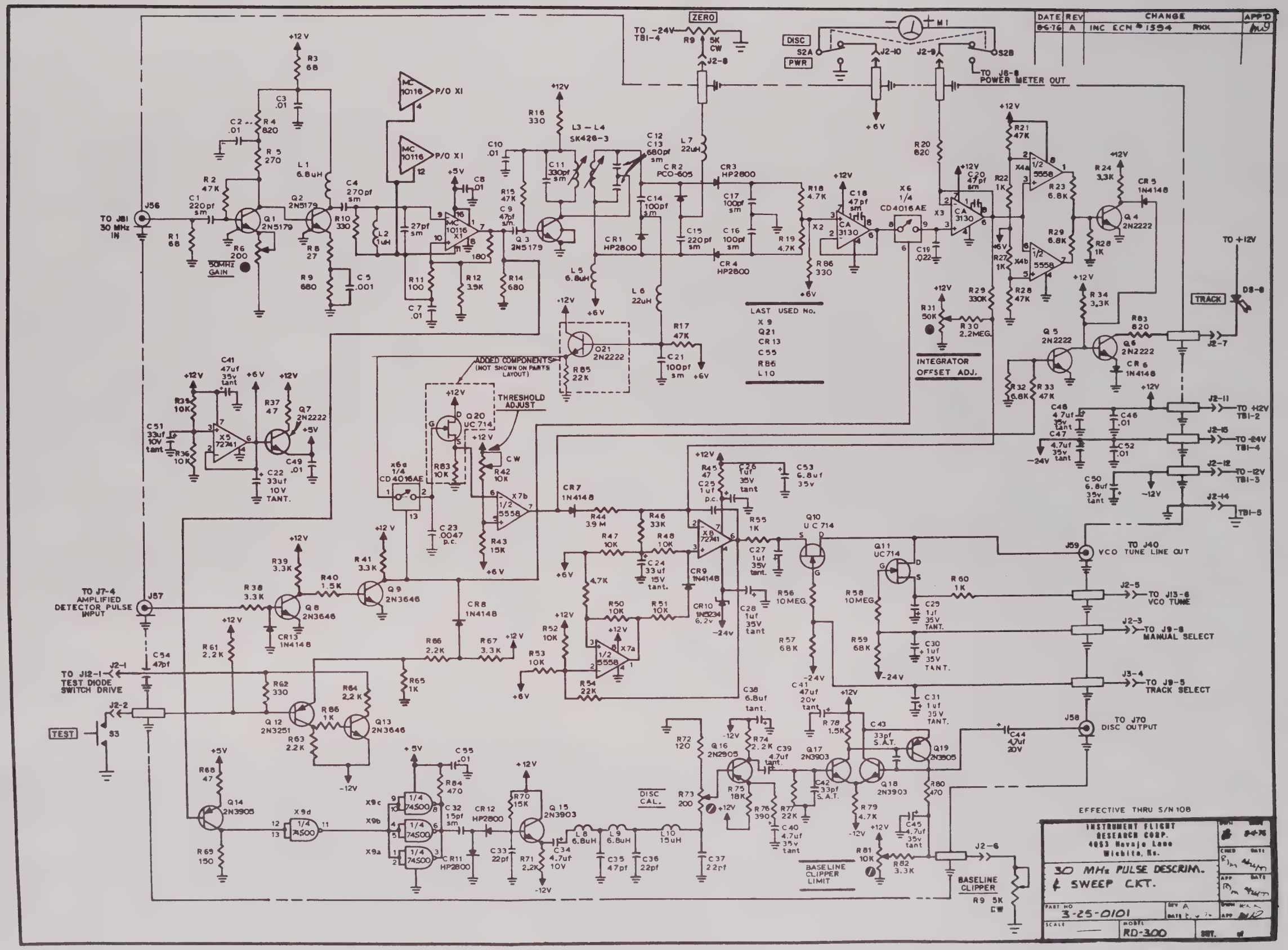
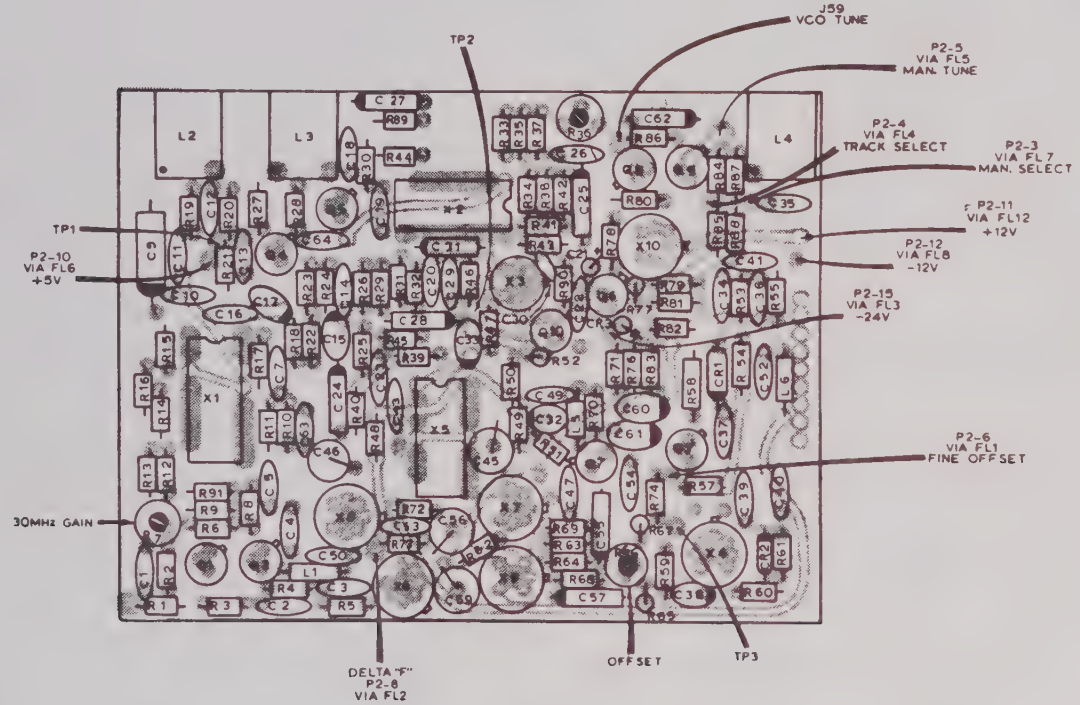
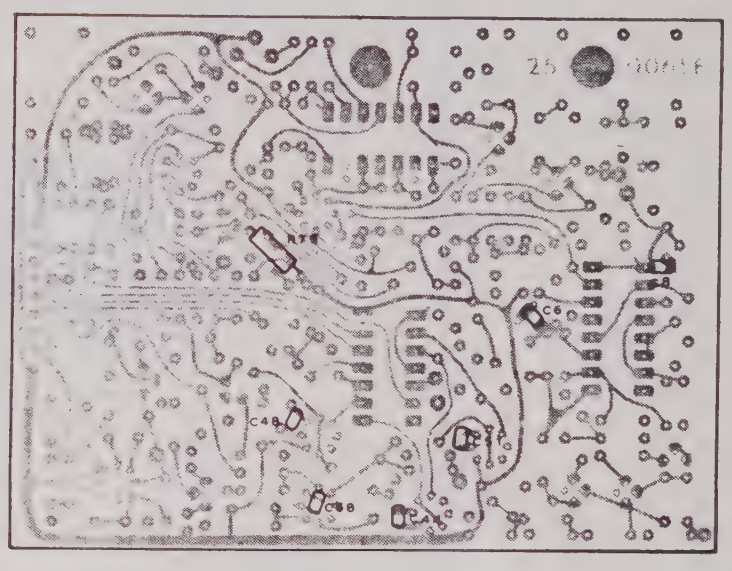

DATE REV CHANGE APP'D
8-6-76 A INC ECN # 1594 RKK
ZERO
TO -24V TB1-4
R9 5K CW
DISC
PWR
S2A
S2B
M1
TO J8-8 POWER METER OUT
TO J81 30 MHz IN
J56
50MHz GAIN
P/O X1
LAST USED No.
X 9
Q21
CR 13
C55
R86
L10
INTEGRATOR OFFSET ADJ.
TRACK
TO +12V
ADDED COMPONENTS (NOT SHOWN ON PARTS LAYOUT)
THRESHOLD ADJUST
TO J7-4 AMPLIFIED DETECTOR PULSE INPUT
J57
TO J12-1 TEST DIODE SWITCH DRIVE
TEST
S3
TO J40 VCO TUNE LINE OUT
TO J13-6 VCO TUNE
TO J9-8 MANUAL SELECT
TO J9-5 TRACK SELECT
TO J70 DISC OUTPUT
DISC CAL.
BASELINE CLIPPER LIMIT
BASELINE CLIPPER
R9 5K CW
EFFECTIVE THRU S/N 108
INSTRUMENT FLIGHT RESEARCH CORP.
4053 Navajo Lane
Wichita, Ks.
30 MHz PULSE DESCRIM. & SWEEP CKT.
PART NO 3-25-0101
SCALE
MODEL RD-300

Fig. 8-12

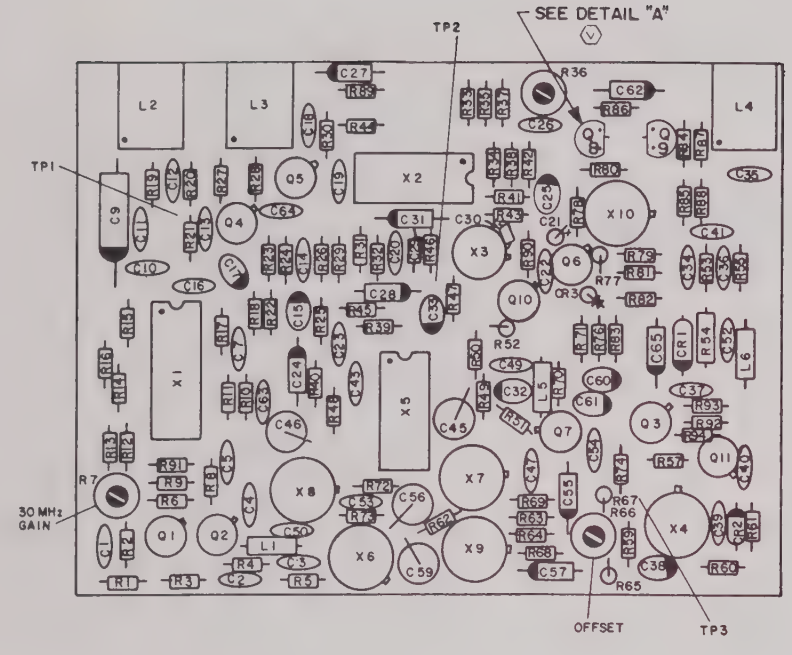


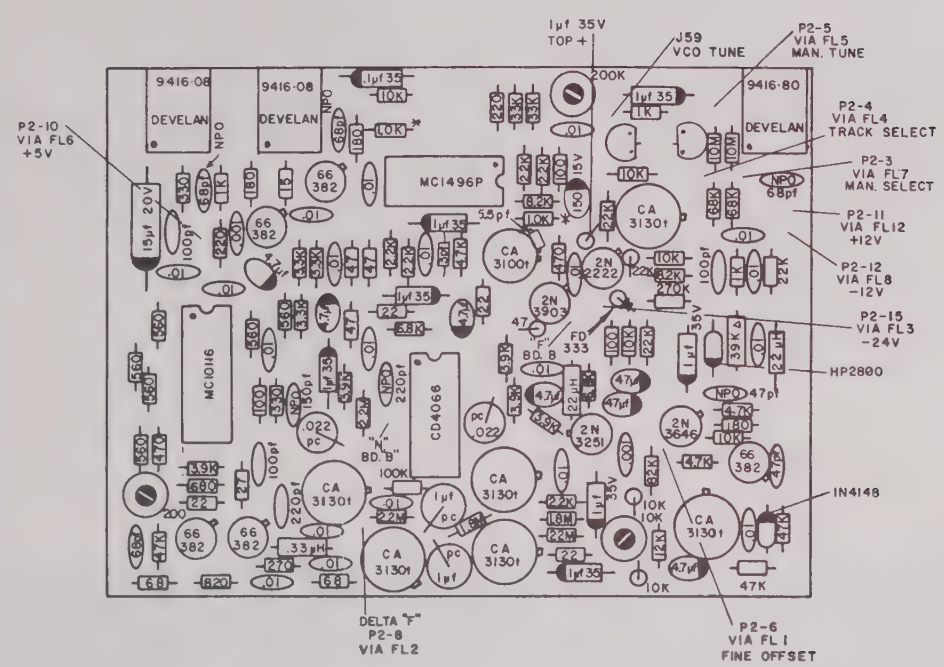
TOP



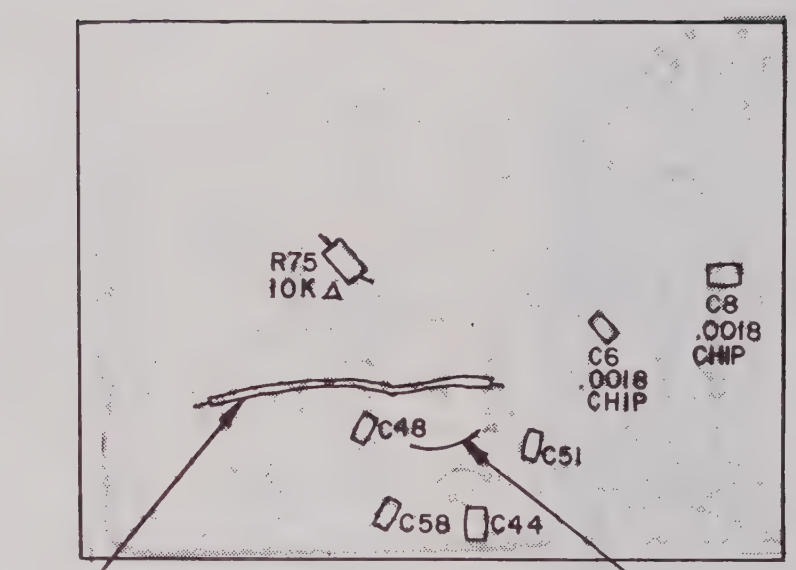
BOTTOM

Fig. 8-13 30 MHz PULSE DISCRIMINATOR BOARD A PARTS LAYOUT
EFFECTIVE S/N 109 AND ON

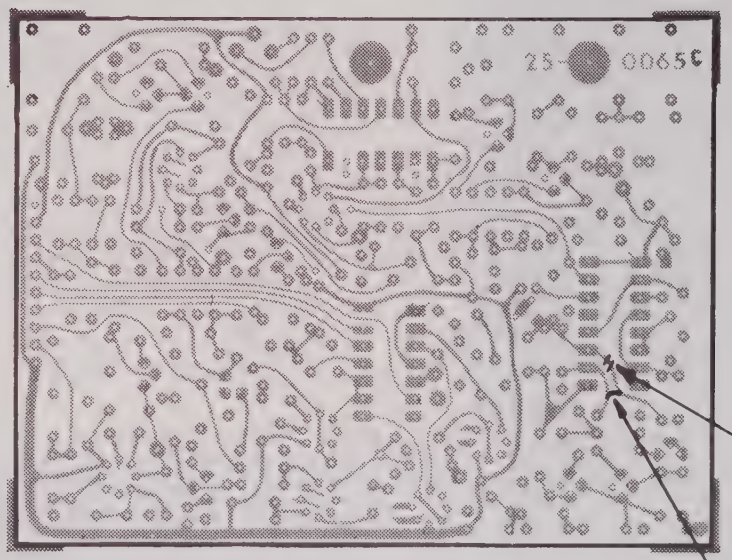




TOP VIEW



SCHEMATIC 0000-2512-400
P.C. BOARD 1700-2506-500 "F"



(T) BOTTOMSIDE
REV "C" BOARDS ONLY

Fig. 8-13-1 30 MHz PULSE DISCRIMINATOR BOARD A (7010-2524-100-W)

30 MHz PULSE DISCRIMINATOR THEORY OF OPERATION

RD-300

(4-25-0124)

1-1. Introduction.

1-2. The 30 MHz Pulse Discriminator processes the 30 MHz information from the Magnetron and Calibration pulses from the SSB module to cause the L-Band VCO to sweep and then track the mixed-down magnetron sample frequency. The major circuits of the 30 MHz Pulse Discriminator are: the pulse discriminator, the sampling switches and the error integrator.

1-3. The discriminator produces an output pulse whose amplitude is proportional to the difference between the L-Band VCO frequency and the frequency of the mixed-down transmitter sample from the Magnetron. This "Information" pulse is followed by a "Calibration" pulse. The Calibration pulse is generated once for each transmitter cycle. The sample switches are closed at appropriate times to store the Information and Calibration pulses at the inputs of the error integrator. The output of the error integrator varies the VCO tuneline voltage until the two pulses are equal and then holds this value until the loop is upset by Magnetron or VCO drift. The sampling timers produce pulses at the midpoint of the magnetron pulse for the information sample and 40μsec later for the Calibration Drive Command and Sample pulse.

1-4. The timer also provides a search sweep command for the VCO if it is not within ±4 MHz of the mixed down magnetron frequency. The ΔF meter driver subtracts the Information voltage from the Calibrate voltage and produces a d.c. voltage used to drive the ΔF METER. If the voltage differences between the Information voltage and the Calibrate voltage is zero, the RD-300 replies to the Magnetron with no frequency offset. If the ΔF FREQUENCY OFFSET Control is adjusted out of the detent position, the RD-300 still tracks the Magnetron drift but with a frequency offset proportional to the difference between the Information and Calibrate voltages. The 30 MHz Pulse Discriminator also controls the TRACK Indicator.

2-1. Pulse Discriminator Operation (Board A).

2-2. The 30 MHz Discriminator Board A (Dwg # 4-25-0124, 1 of 2) receives the 30 MHz (approx) pulse groups from the output of the Single Sideband (SSB) Module. It determines if the frequency of the pulse groups is above or below 30 MHz and produces an output voltage which controls the output frequency of the Voltage Controlled Oscillator (VCO) Module. The VCO output frequency is tuned until the output of the SSB Module is 30 MHz. When the VCO has been tuned and its output mixed with the 8.25 GHz in the X-Band Front End, the resulting frequency equals the frequency of the radar under test.

2-3. The 30 MHz output of the SSB Module is inputted into the 30 MHz Pulse Discriminator via J56 and is applied to the base of Q1 (66382). The signal is amplified by Q1 & Q2 (66382) and applied to the inverting (-) input of X1b pin 9 (MC10116). The gain of Q1 is adjusted by the 30 MHz Gain pot R7 (See fig. A-1). A 30 MHz resonant circuit consisting of L1, C4 and C63 is used to reject any 101, or 305 MHz frequencies from the SSB Module.

2-4. X1b, X1c and X1a (MC10116) are used as limiting amplifiers. They are driven until they saturate and clip the 30 MHz output of Q2. This clipping action results in RF pulses with clean envelopes (See Fig. A-2).

2-5. The conditioned RF output of X1c is applied to a 30 MHz tuned circuit. The tuned circuit consists of L2 and C12. A voltage divider consisting of R20 and R21 reduces the signal level to 100 mV at TP1. The signal is then applied to the base of emitter-follower Q4 (66382). The output of Q4 is applied to the signal input of X2 (MC1496P) pin 1 and to a 90° phase-shifting circuit. This phase-shifting network consists of L3 and C18. The phase shifted output of the network is applied to the carrier input of X2 pin 8. X2 is a discriminator/balanced modulator I.C. Difference in frequency between the Information pulse or the 38 µs wide Cal. pulse and 30 MHz are outputted as d.c. levels on X2 pins 6 & 12. Discrimination of frequency is brought about by the phase shifting properties of tank circuit L3/C18. This tank circuit is tuned to give a 90° phase-shift at 30 MHz. Frequencies above or below 30 MHz advance or retard the amount of phase-shift. Minimum output from X2 is obtained when the amount of phase shift is 90° because the average voltage is zero, over a 30 MHz cycle. For phase shifts above or below 90° (representing frequencies above or below 30 MHz), the output voltage on X2 pins 6 & 12 are either positive or negative.

2-6. During calibration, the phase-shift inductor L3 is adjusted for maximum signal level at X2 pin 8 and Carrier Balance pot R36 is adjusted for minimum 30 MHz feedthrough at TP2.

2-7. The output of X2 pins 6 & 12 is fed to the Front Panel DISC OUT CONNECTOR via X3 (CA3100) on Board A and X3 (CA3100) on Board B. The discriminator signal is also applied to the base of Q10 (2N3903) and applied to error switches X5a, X5b and X5d (CD4066).

3-1. Sampling Switches and Error Integrator Operation.

3-2. The discriminator output from Q10 (See Fig. A3-A5) is sampled by error switches X5a, X5b and X5d. Sampling is allowed at appropriate times by sampling gates from Board B at X5a pin 13, X5b pin 5 and X5d pin 12. The discriminator Information pulse is sampled by X5b and X5d. The discriminator Cal pulse is sampled by X5a.

3-3. When a sampling switch is closed by a sampling gate, the associated storage capacitor is charged to the peak voltage of the discriminator pulse. The storage capacitor associated with X5b is small to allow for a fast signal acquisition time.

3-4. After arrival of the discriminator signal at the sampling gate inputs and during the 3 µs Information pulse, X5b is closed by a 0.15 µs sampling gate from Q10 (2N3646) on Board B (See Fig. A-6). At this time, C43 charges. This narrow gate is timed to allow sampling at the center of the Information pulse only. Frequency transients may be produced at the leading and trailing edges of the Information pulse by the Magnetron. By sampling the Information pulse at its center, these transients are prevented from affecting operation. The voltage level stored by C43 is reflected by the output level of X6 (CA3130).

3-5. Approximately 38 µs after the leading edge of the Information pulse, the second sampling gate from Board B causes X5c (CD4066) to close. This signal on X5c pin 6 is 10 µs long and allows C45 to charge to the output value of X6. The output on X7 pin 6 (CA3130) is maintained by C45 (See Fig. A-7).

3-6. The Cal pulse portion of the discriminator signal arrives at sampling switch X5a (CD4066) in coincidence with the 2nd sampling gate. At this time, the Cal sampling gate causes X5a to close. This Cal sampling gate at X5a pin 13 allows C46 to charge to the average voltage of the Cal pulse during the sampling period. The voltage level stored by C46 is reflected by the output level on X8 pin 6 (CA3130).

3-7. The output levels of X7 and X8 are applied to the inputs of differential integrator X9 (CA3130). The output at X9 pin 6 will be between -2V and -16V d.c., depending upon the frequency of the radar under test.

3-8. Q7 (2N3251A) amplifies and translates the output of X9 to the -1V (≃ 9290 MHz) to -16V (≃ 9430 MHz) range needed at the tuneline (See Fig. A-8). FET switches Q8 & Q9 (2N4223) connect the tuneline to either the error amplifier output in Track Mode or the manual tune input signal on P2 pin 5 in the Man Mode of operation.

3-9. When in Track or Track -10 dB Mode of operation, a ground level is applied to the gate of Q8, via R84 and Front Panel switches. This allows the VCO tune line voltage to pass thru R86 to the VCO Module.

3-10. In the Manual Mode, -24 V is applied to the gate of Q8. This biases Q8 OFF. At this time, a ground level is applied to the junction of R87 & R88. This biases Q9 ON and allows the manual tune voltage from the Front Panel to pass thru Q9 to the VCO module.

3-11. When radar pulses are present but the VCO is not within ±4 MHz of the magnetron frequency, a search sweep is initiated by a logic 1 from X9 pin 11 (Board B) on search line (E). The current through R63 caused by this signal overrides the 6V baseline level at X7 pin 6. This current also causes a negative sweep ramp to be generated by X9. When the tuneline output at the collector of Q7 is at its high frequency limit (-16V ≈ 9430 MHz), the output of X10 pin 6 (CA3130) goes high. With the output of X10 high, Q6 (2N2222) is biased to turn ON. At this time, ground is applied to one side of R76. With respect to the +6V baseline level, R76 now presents a strong negative input of X9. This causes the output of X9 to rise quickly dropping the tuneline output voltage to its lower frequency limit (-1V ≈ 9290 MHz). X10 also senses when the lower frequency limit of the tuneline voltage has been reached and turns Q6 OFF. With Q6 OFF, another negative ramp sweep is allowed to start.

4-1. Signal presence detector (Board A).

4-2. The processed Information and Calibration pulses on X1c pin 15 are applied to a 30 MHz tank circuit consisting of L4 & C35. The output of the 30 MHz tank circuit is applied to the anode of C1 (HP2800) via a voltage divider. The voltage divider provides a nominal +2.5 V bias to CR1. CR1 selects the positive portions of the RF pulse group. C37 removes the 30 MHz RF component of these positive going pulses. The positive detected envelope output of C37 is applied to Q3 (2N3646). Q3 inverts and amplifies the pulse envelope before applying it to the inputs of X4 (CA3130). The high input impedance of X4 allows C38 to maintain charge at about 4.9V dc. X4 is a comparitor amplifier whose output on pin 6 is positive going pulses. The output of X4 is routed to the presence detector circuitry located in Board B.

5-1. 30 MHz Discriminator Board B Introduction (Dwg #4-25-0124 2 of 2).

5-2. The 30 MHz Pulse Discriminator Board B receives detected radar pulses from the X-Band Front End. These pulses are processed to provide triggering and gating signals to 30 MHz Pulse Discriminator on Board A.

6-1. Radar Pulse Processing.

6-2. Positive detected radar pulses from the X-Band Front End (See Fig. B-1) are inputted onto Board B via J-57 and applied to the base of Q1 (2N3646). Q1 & Q2 (2N3646) form a comparator to turns Q3 (2N3646) OFF for the duration of the radar pulse by producing negative gating pulses. R5 allows regulation of the d.c. voltage and biases the emitters of Q1 & Q2 slightly negative (about -0.7V). This causes Q1 to be biased slightly into the cutoff region until a detected radar pulse is received. This improves the response of Q1 for narrow radar pulses. With Q3 OFF, constant current source Q4 (2N3905) charges C8 at a linear rate toward +6V.

6-2. This causes a positive going ramp at the emitter of buffer transistor Q5 (2N3903) (See Figure B-2). The output of Q5 is applied to the noninverting (+) input of X1 (CA3130) as a peak detector mode signal.

6-3. Whenever the peak value of the linear ramp output of Q5 exceeds the voltage stored on C11 by previous pulse peaks, the output of X1 goes high. This causes C11 to be charged to the peak voltage of the ramp. The level stored on C11 is maintained by CR22 (1N4148) which isolates X1 from C11. The high input impedance of X2 (CA3130) also prevents C11 from discharging.

6-4. Op amp buffer X2 is used to bias Q6 (2N3646) ON when an output level of +4V (nominal) is present on X2 pin 6. For a magnetron pulse width less than 3 µs, the voltage on X2 pin 6 will be lower. The d.c. level output level of X2 is reduced about 40% by R15 & R16.

6-5. Q6 & Q7 (2N3646) form a voltage comparator. When Q6 is biased ON by the output of X2, the emitter of Q7 is biased positive. This increases the signal level that must be applied to the base of Q7 before Q7 turns ON This causes the output of Q7 to be proportional to the duration of the input pulse. When the ramp passes through its 60% point, Q7 is biased ON. This change of state triggers the 0.15 µs one-shot sampling gate.

7-1. Sampling Gate Generation.

7-2. The 0.15 µs sampling gate is generated by a one-shot consisting of C21, R19, Q8, Q9 and Q10 (2N3646). This 0.15 µs pulse is generated after the midpoint of the magnetron pulse. C21 and R19 differentiate the output of Q7 to narrow negative going spike which turns Q8 OFF for the duration of the pulse. Q8 provides two outputs of opposite polarity which are applied to the bases of Q9 & Q10. Since (normally ON) Q10 is turned OFF by a negative going spike and Q9 (which is normally OFF) is turned ON by a positive spike, this causes Q9 to output a positive pulse of approximately +10V with a duration of 0.15 µs. This is the first information sampling gate and is routed to X5b pin 5 of Board A. The 0.15 µs pulse is generated at approximately the 50% point of the Information pulse. For Information pulses longer than 3 µs, the 0.15 µs pulse is generated 3 µs after the leading edge of the detected pulse at J57.

7-3. The second information sampling gate is generated by X5 (CD4047) C31, and X4a (CD4001). The output of Q1 is used to trigger X5 which produces a 38 µs positive pulse. The leading edge of this pulse is coincident with the leading edge of the output pulse from Q1. Transition of the pulse on X5 pin 10 back to a low logic level is sensed by C31. C31 causes the output of X4a to go positive for 10 µs and generate the second information sampling gate. This pulse is delayed 30 µs from leading edge of the detected pulse by X5.

7-4. The transition to a low logic level by the output pulse from X5 also triggers X6 (CD4047). This generates a 38 µs positive gate pulse at X6 pin 10 and a 38 µs negative gate pulse at X6 pin 11. The 38 µs positive pulse on X6 pin 10 is used as the cal sampling gate. Drive transistors Q11 (2N3905) and Q12 (2N3905) use the negative 38 µs pulse output on X6 pin 11 to provide the cal drive pulse to the S.S.B. Diode Switch.

7-5. The NO XMTR SAMPLE signal is developed by X7 (CD4047) X4c (CD4001), X6 and X8 (CD4047). If the input pulses from J57 are spaced greater than 40ms, the output of X7 pin 10 is a 40ms positive pulse. If the trigger pulses are closer than 40ms, the output of X7 is high. If no pulses are present to retrigger X7, its output remains at a low logic level. With X7 pin 10 low, the 12 Hz oscillator X8 is allowed to run. Each positive going edge of X8 output triggers X6, causing it to generate 30 µs pulse gates. The output of X6 pin 11 is routed to X4c pin 9. With X4c pin 8 low, these pulses on X4c pin 9 cause X4c to generate the positive NO XMTR sample pulse which is applied to Board A.

7-6. The NO XMTR SAMPLE pulse is used to energize X5d on Board A. X5d causes both the information and calibrate sample and hold storage capacitors used to store the Calibrate pulse level. This keeps the ΔF METER reading at zero for this case of no detected pulses.

7-7. When the detected pulses are closer together than 40ms, X7 is continuously retriggered. This produces a high logic level on X7 pin 10. This high level resets X7 and locks out the NO XMTR sample pulses at X4c.

8-1. Search Signal Generation.

8-2. When the detected pulse frequency and the VCO frequency are within 4 MHz of the magnetron frequency (30 MHz ±4 MHz), op amp comparitor X4 (on Board A) is triggered. This presence of signal signal plus the detected pulse signal at X5 pin 6 are gated thru X4d (CD4001) to trigger X9 (CD4047). At this time, the $\overline{Q}$ output of X9 pin 11 remains at a low logic level. As long as another detector pulse occurs within 40ms (25 Hz), $\overline{Q}$ stays low. X4d is used to trigger X9 when both Detector and Presence of Signal pulses are present.

8-3. When detected pulses are present but there are no 30 Hz information pulses, X9 times out and its $\overline{Q}$ output on X4 pin 10 goes high, with $\overline{Q}$ of X9 high, a search command is sent out to the error integrator.

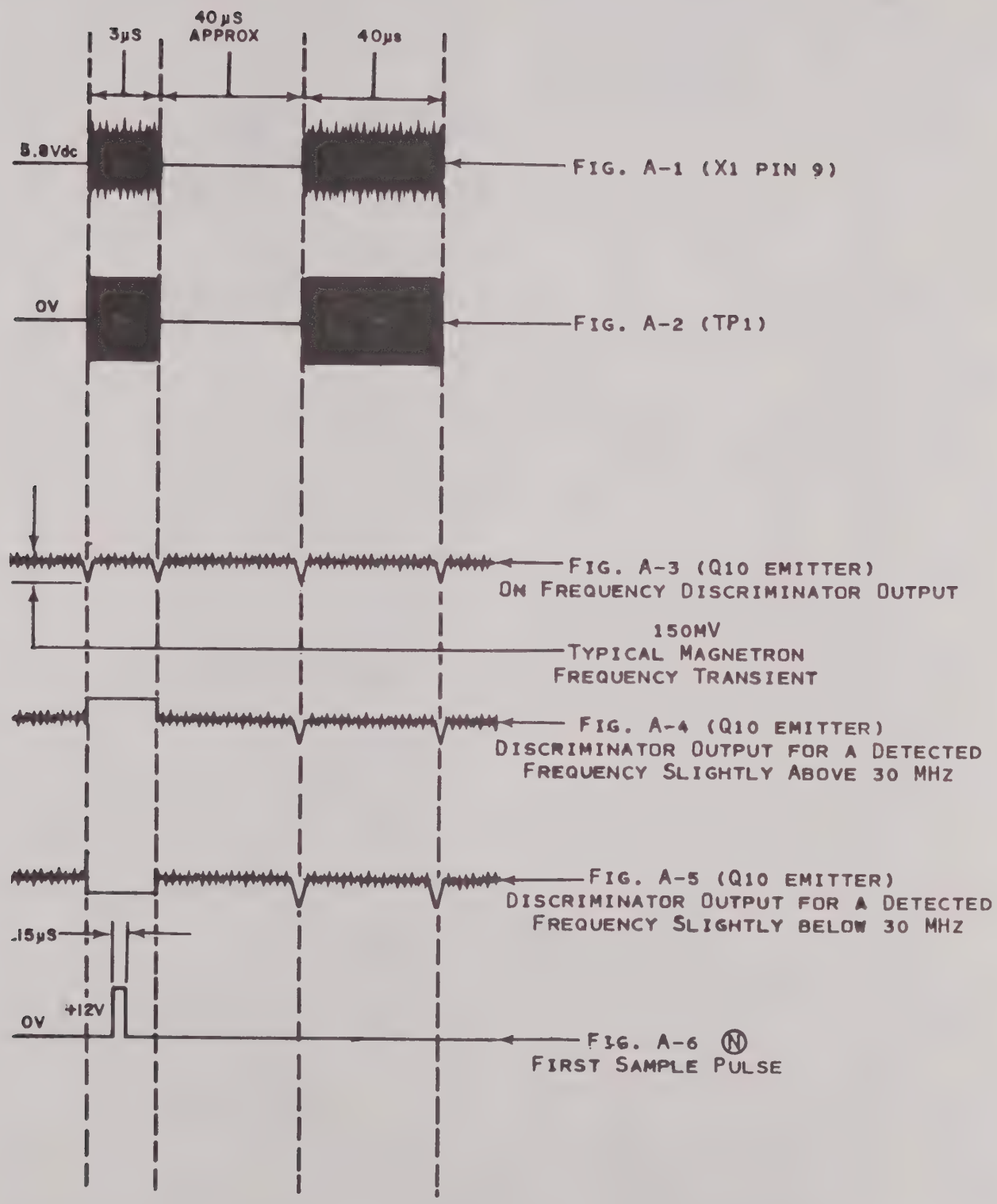
9-1. TRACK LED Operation.

9-2. TRACK LED is turned ON. When the Information and Calibrate signal levels indicate that the VCO frequency is not within about ±1 MHz of the mixed-down magnetron frequency, Q15 is turned ON. With Q15 ON, the cathode of the TRACK LED is pulled toward ±12V. This turns the TRACK LED OFF.

9-3. When a search sweep in not initiated by X9, Q13 is turned OFF. When a search sweep is initiated by X9, Q13 is turned ON. At this time, the cathode of the TRACK LED is pulled toward ±12 V through Q13 and the LED is biased to turn OFF.

10-1. ΔF Meter Driver Operation.

10-2. The information and calibration d.c. levels are applied to differential amplifier X10b (MC1458). The resultant output of X10b on pin 7 may be adjusted by the ΔF CAL pot R41 during calibration. The output voltage is transformed into a current by X10a (MC1458) and Q14 (2N3251A). The output of Q14 is applied to the ΔF METER via the ΔF/PWR SWITCH on the Front Panel.


3µS
40µS APPROX
40µs
5.8Vdc
FIG. A-1 (X1 PIN 9)
0V
FIG. A-2 (TP1)
FIG. A-3 (Q10 EMITTER)
ON FREQUENCY DISCRIMINATOR OUTPUT
150MV
TYPICAL MAGNETRON
FREQUENCY TRANSIENT
FIG. A-4 (Q10 EMITTER)
DISCRIMINATOR OUTPUT FOR A DETECTED
FREQUENCY SLIGHTLY ABOVE 30 MHz
FIG. A-5 (Q10 EMITTER)
DISCRIMINATOR OUTPUT FOR A DETECTED
FREQUENCY SLIGHTLY BELOW 30 MHz
.15µS
+12V
0V
FIG. A-6 (N)
FIRST SAMPLE PULSE

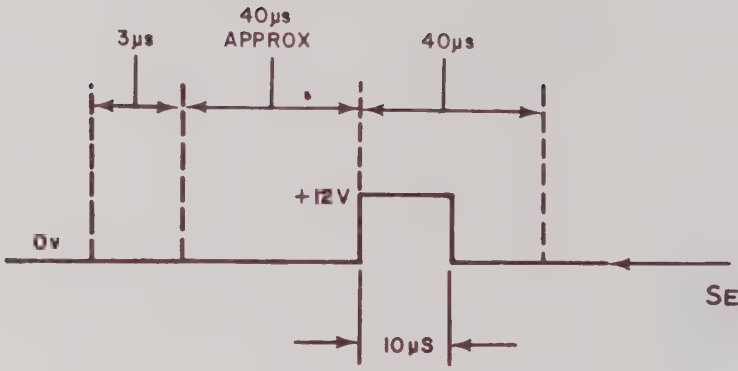


FIG. A-7 ©
SECOND SAMPLE PULSE

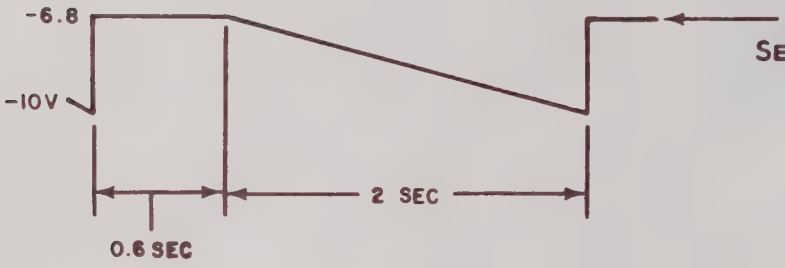


FIG. A-8
SEARCH SWEEP (EMITTER OF Q7)

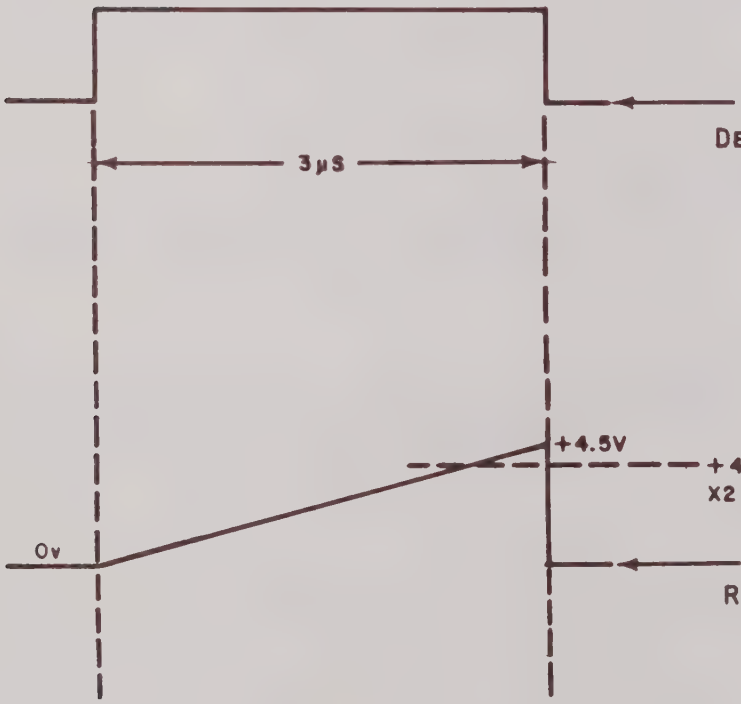


FIG. B-1 (J57)
DETECTED 3µS MAGNETRON PULSE

FIG. B-2
RAMP OUTPUT AT EMITTER OF Q5

DATE	REV	CHANGES	APP'D
2-3-77	A	INCORP ECN #1910 WLW	
3-28-77	B	INCORP ECN No. 1968 Jnv RKK	
4-19-77	C	INCORPORATED ECN No. 2026 JNV	
3-9-78	D	INC ECN 2822	
3-28-78	E	INC ECN 2891 JAJ	
1-12-79	F	INC ECN #3285 RLD	
4-16-79	G	INC ECN #3335 RLD	
5-9-79	H	INC. ECN #3270 RLD	
7-23-79	J	INC. ECN #3389 RLD	
2-19-80	K	INC. ECN #3428 RLD	
4-15-80	L	INC. ECN #3449 RLD	
11-28-82	M	INC ECN # 3725 OFG	SB
10-12-83	N	INC ECN 7631 DAH	VLH

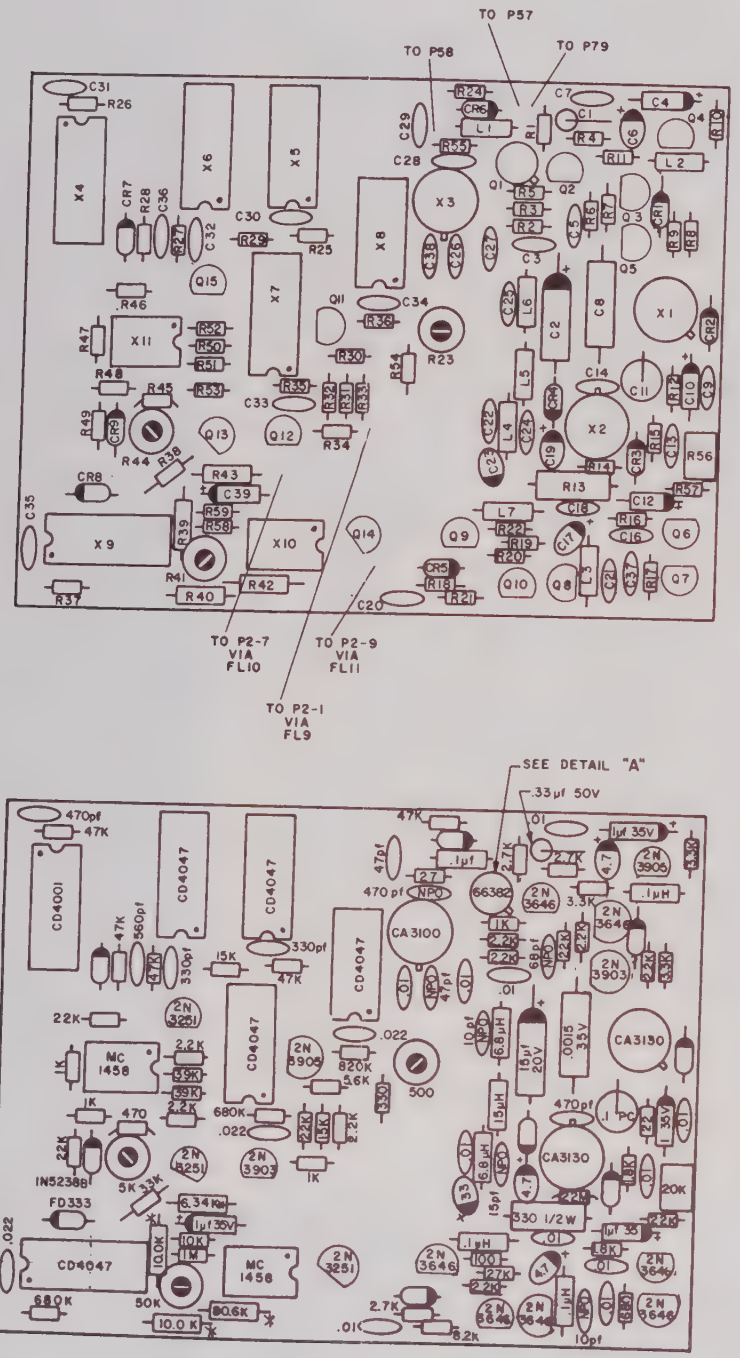
NOTE
1. ALL RES. MARKED * ARE 1%
2. LAST USED NO.
   X 10
   Q 10
   CR 3
   R 94 skip 96
   C 64 skip 42
   L 6
3. ALL CAPACITOR VALUES ARE IN µf UNLESS OTHERWISE SPECIFIED.

ITEM	REQ'D	PART NO	DESCRIPTION
			LIST OF MATERIALS

TOLERANCES (UNLESS OTHERWISE SPECIFIED)	DRAWN 11-29-76	- IFR INC - WICHITA KANSAS	
	CHECKED	TITLE 30 MHz PULSE & DISC. SCHEMATIC (BOARD 'A')	
	APPROVED		
MATERIAL	SIZE D	PART NUMBER 0000-2512-400	REV N
FINISH	SCALE	WEIGHT	SHEET 1 OF 2

25-0240 | 1 | RD300 | NEXT ASS'Y | QTY | MODEL | APPLICATION

Fig. 8-14



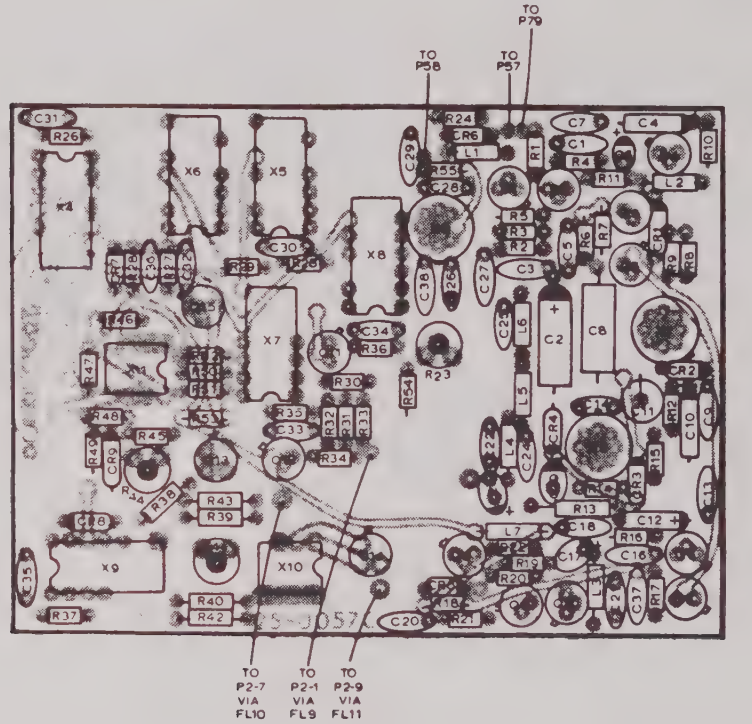
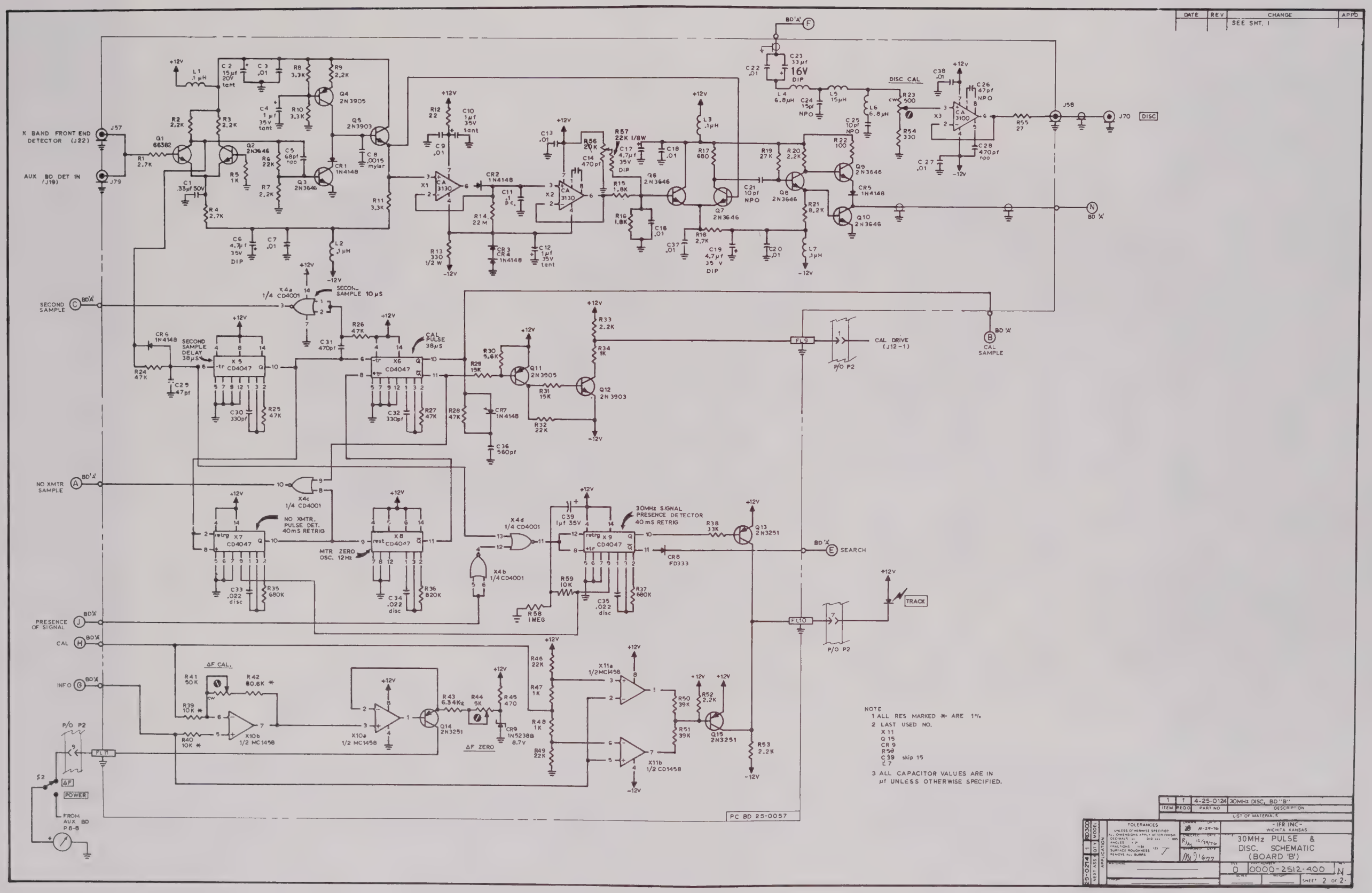


Fig. 8-15 30 MHz PULSE DISCRIMINATOR BOARD B PARTS LAYOUT (7010-2524-100-L)



DATE
REV
CHANGE
APP'D
SEE SHT. 1
X BAND FRONT END DETECTOR (J22)
AUX BD DET IN (J19)
SECOND SAMPLE
NO XMTR SAMPLE
PRESENCE OF SIGNAL
CAL
INFO
DISC CAL
CAL DRIVE (J12-1)
CAL SAMPLE
SEARCH
TRACK
SECOND SAMPLE 10 μS
SECOND SAMPLE DELAY 38μS
CAL PULSE 38μS
NO XMTR. PULSE DET. 40mS RETRIG
MTR ZERO OSC. 12Hz
30MHz SIGNAL PRESENCE DETECTOR 40 mS RETRIG
ΔF CAL.
ΔF ZERO
POWER
FROM AUX BD P8-8
PC BD 25-0057
NOTE
1 ALL RES MARKED * ARE 1%
2 LAST USED NO.
X 11
Q 15
CR 9
R 59
C 39 skip 15
L 7
3 ALL CAPACITOR VALUES ARE IN μf UNLESS OTHERWISE SPECIFIED.
4-25-0124
30MHz DISC, BD "B"
LIST OF MATERIALS
-IFR INC-
WICHITA KANSAS
30MHz PULSE & DISC. SCHEMATIC (BOARD 'B')
0000-2512-400
SHEET 2 OF 2

Fig. 8-16

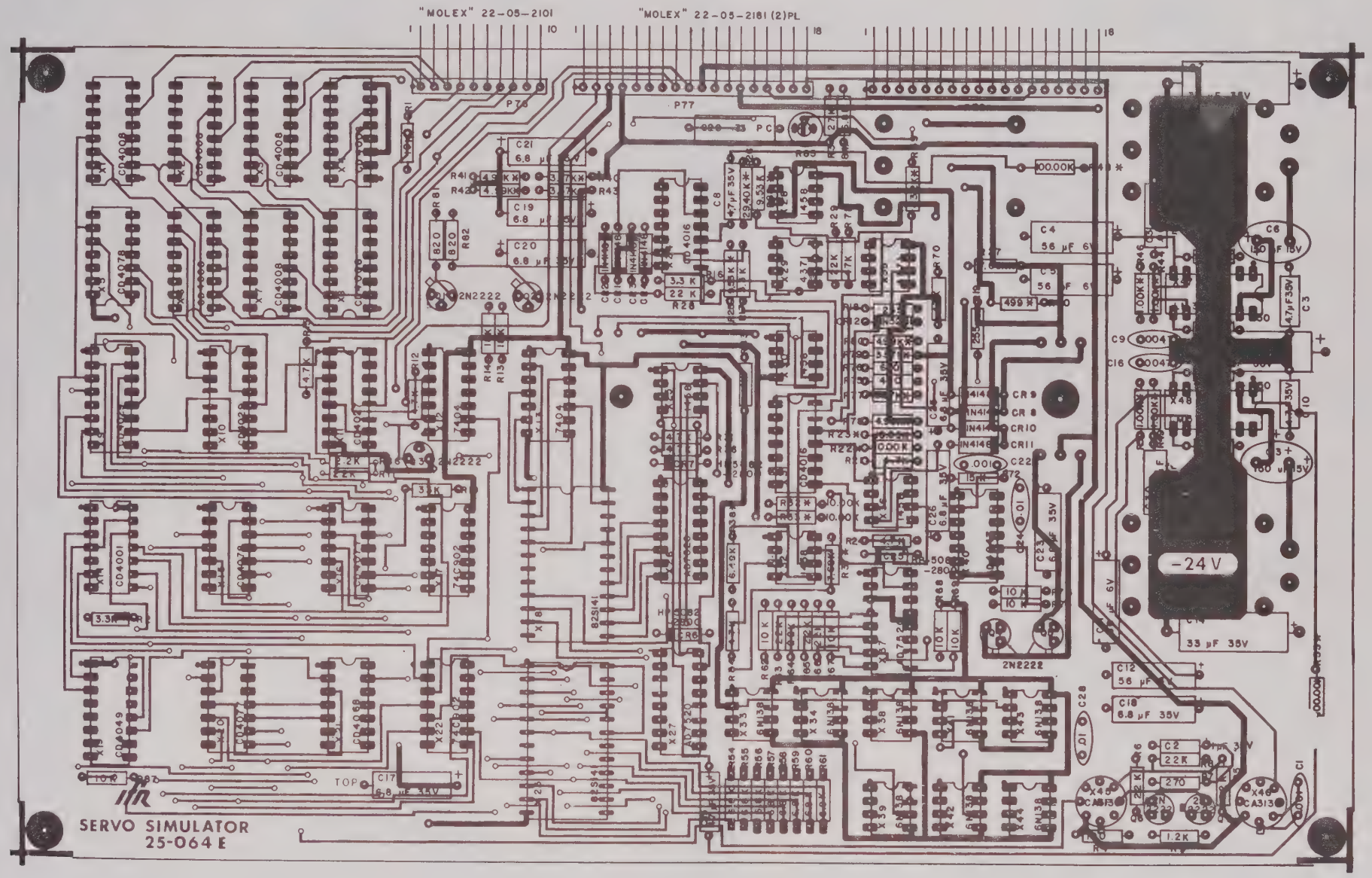


Fig. 8-17 SERVO SIMULATOR BOARD PARTS LAYOUT (Top View)

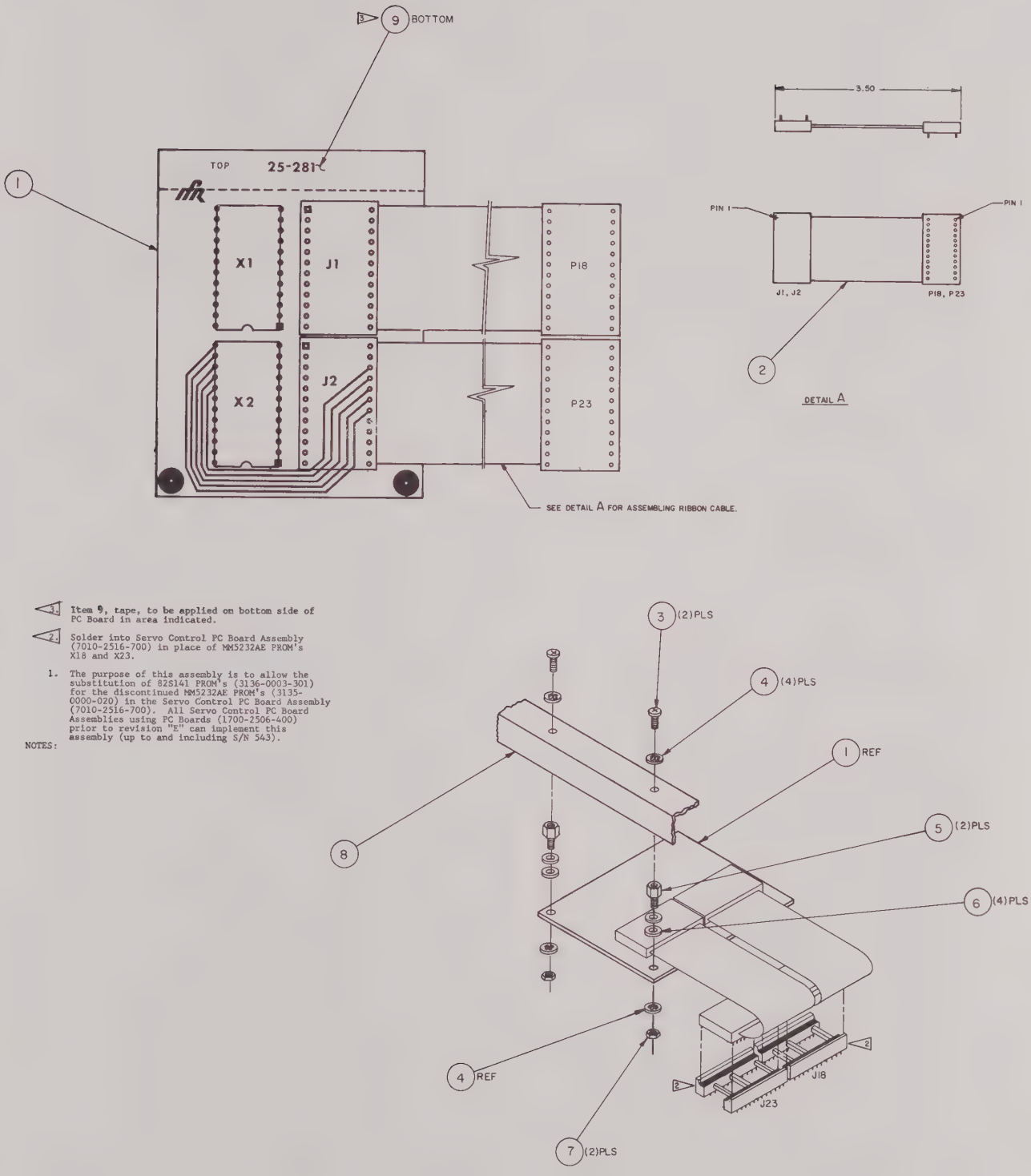


Fig. 8-17-1 82S141 PROM CONFIGURATION

SERVO SIMULATOR THEORY OF OPERATION

RD-300

1-1. Introduction.

1-2. The Servo Simulator System of the RD-300 provides a sweep signal to radar indicators that normally requires sweep motor and resolver synchro signals from an antenna. The Servo Simulator System modulates an external reference voltage with position information that can be selected at fixed angles. The external reference voltage may also be modulated with position information that is swept between angles selected on the ANT ANGLE THUMBWHEELS. The Servo Simulator System develops outputs in either 3-phase synchro, 2-phase resolver, or linear azimuth pot formats.

1-3. Typical output reference signals are 115, 26.4, or 6.6V a.c., 400 Hz; the RCA AVQ series sweep ramp, or the King KWX-50 azimuth pot Hi and Lo voltages.

1-4. The Servo Simulator System consists of a BCD-to-binary converter for angle input, anteena sweep rate clock, angle counters, two look-up ROMs and output D/A converters, amplifiers and transformers.

2-1. BCD-to-Binary Converter Operation.

2-2. The BCD-to-binary converter uses 4-bit binary adders X1-X8 (CD4008) to convert the two decade BCD angle word from the thumbswitches to an eight-bit binary word at the outputs of X1 and X6.

2-3. When angle counters X9-X10 (CD4029) are set to count down, X9 and X10 begin counting at the value set in the ANT ANGLE BCD THUMBSWITCHES and count down to zero. At the zero count, the outputs of X9 and X10 go high. This causes the output of 8-input NOR gate X15 (CD4078) to go low. The output of X15 is inverted by X19 (CD4049) and applied to X14d pin 12 (CD4001). At this time, the output of X14d is applied as a low logic level pulse to the Set input of X11a (CD4027). X11a is a set-reset flip-flop. The pulse sets the Q output of X11a high. This high level sets the programmable up-down angle counters X9 & X10 to start counting up. When a count equal to the ANT ANGLE data is reached on X9 and X10, the outputs of X16 & X20 (CD4077) are all high. These high levels on X16 pins 11, 10, 4, & 3 and X20 pins 11, 10, 4 & 3 cause the output of 8-input NAND Gate X21 (CD4078) to go low. When this happens, X21 causes the output of X14c (CD4001) to go high. This high output clears X11a. At this time, Q of X11a goes low and another count cycle begins.

2-4. When an angle of 0.0° is selected on the ANT ANGLE THUMBWHEELS the output of 9-input NOR gate X5 (CD4078) forces a load command to counters X9 & X10. This causes X9 & X10 to remain at zero count.

2-5. The antenna rate clock output squarewave on X14b pin 4 is used as the Least Significant Bit (LSB) of the angle data word. This makes a total of 9 bits in the angle word.

3-1. Antenna Rate Clock Operation.

3-2. The antenna rate clock consists of X45 & X46 (CA3130) Q6, Q7 (2N2222) and associated circuitry. When the ANT RATE CONTROL on the Front Panel is out of the detent position, Q7 is biased to turn ON by X46. With Q7 ON, C2 begins to discharge through Q7 & R9 to ground. When C2 reaches a low enough voltage level, comparator X45 is tripped and the output of X45 goes high. With X45 pin 6 high, Q6 is biased to turn ON. At this time, Q6 charges C2 toward +12V until the voltage on C2 is sufficient to cause the output voltage of X45 to trip low. The bias on the base of Q7 is controlled by the ANTENNA RATE Pot R11. The bias on the base of Q7 determines the discharge rate of C2 which controls the frequency of the antenna rate clock.

4-1. Static Angle Simulation.

4-2. When the ANT RATE Control is in the detent position, the Servo Simulator System presents a static angle simulation which, at pins a and b of the ANTENNA SIMULATOR CONNECTOR, is represented by a voltage proportional to degrees set by ANGLE SELECTORS (33). During static angle simulation; a high level is applied to X14a pin 2 (CD4001); X14b pin 5 (CD4001) and to one side of R10 via S10.

4-3. The high logic level present on X14a causes X14a pin 3 to remain low. This low level is inverted by X19 and applied to the PRESET inputs of X9 and X10. This input to X9 & X10 causes the angle word from the BCD-to-Binary Converter to be loaded into X9 & X10.

4-4. The high logic level present on X14b pin 5 blocks the Antenna rate clock during static angle operation. At this time, X14 pin 4 remains low.

5-1. Quadrant Selection.

5-2. Left - Right static quadrant selection in accomplished by use of the ANTENNA QUADRANT SELECTOR SWITCHES on the Front Panel. When the RIGHT ANTENNA QUADRANT SELECTOR SWITCH is depressed, the SET input X11b pin 9 is brought high. This causes the Q output of X11b to go high and the $\overline{Q}$ output of X11b to go low. With Q high, Q2 (2N2222) is biased to turn ON. At this time, Q2 causes the RIGHT QUADRANT INDICATOR DS9 to turn ON by providing a ground to the cathode of DS9.

5-3. With the Q output of X11b high, the output of comparitor X30b pin 7 (5558) is forced to go high. Operation of the left static quadrant selection circuit is similar to the above.

5-4. When sweeping, flip-flop X11b forms a right/left quadrant command for every other output change of X11a. During sweep the counter cycle becomes:

1. Count down from selected angle data word to zero.
2. Change quadrant command generated
3. Count up to selected angle data word.
4. Count down to zero.
5. Change quadrant command generated.
6. Count up to selected data word.
7. Repeat cycle.

5-5. The standard resolver format calls for zero output on the sine channel and full output on the cosine channel at a bearing of zero degrees azimuth. Some radars require equal outputs on both channels at a bearing of zero degrees azimuth. This is essentially a 45° shift from the standard format and is accomplished by grounding P73 pin X and setting the ANT ANGLE Switch to 89°. The ground on P73 pin X is inverted to a high logic level by X19 (CD4001) and applied to the set input of X11b. This causes the output to be fixed to the right quadrant, with a 0° to 89° sweep. For indicators utilizing this offset format, this represents a -45°, 0°, +45° sweep.

6-1. Resolver and Synchro Output Signal Generation.

6-2. The angle 9-bit word is connected to X23 (MM5232AE1) sine lookup ROM by signal lines A-I. The cosine lookup ROM table is formed by connecting the angle word through inverters X12 & X13 (7404) to an identical ROM X18 (MM5232AE1). The outputs of ROM's X23 & X18 program digital-to-analog (D/A) converters X26 & X27 (AD7520) that multiply the reference input on P77 pin 12 or P78 pin 4 by a number between 0 and 1. The sine D/A output at X25b (CD4016) is multiplied +1 or -1 by X24 (CD4016) and X32a (5558) depending on which quadrant is selected. For the left quadrant, the output of X11b on signal line K is high and on signal line J is low. This causes pins 8 & 9 of X24 to be connected and pin 10 & 11 of X24 to be open. At this time, the output of the D/A converter (via buffer X25d (5558) is allowed to pass thru X32a where it is inverted. The output of X32a is applied to the output circuitry.

6-3. When the right quadrant is selected, the output of X11b causes X24 pins 10 & 11 to be connected and X24 pins 8 & 9 to be open. At this time, the output of X25b is allowed to pass thru X24 pins 10 & 11 to the output circuitry.

6-4. Bridge amplifiers X47 and X48 (LM377) are set for a gain of 91 by the ratio of R47 to R44 and the ratio of R49 to R52. For stability reasons however, their inputs are reduced by about a factor of 100 by voltage dividers R48 & R44 and R53 & R49. This gives an overall gain of 0.9 from the outputs of X24 to the outputs of X47a, X47b, X48, X48b. The outputs of X47b and X48b are 180° out of phase with the outputs of X47a & X48a. This yields a gain of 1.8 across the primaries of T3 & T4.

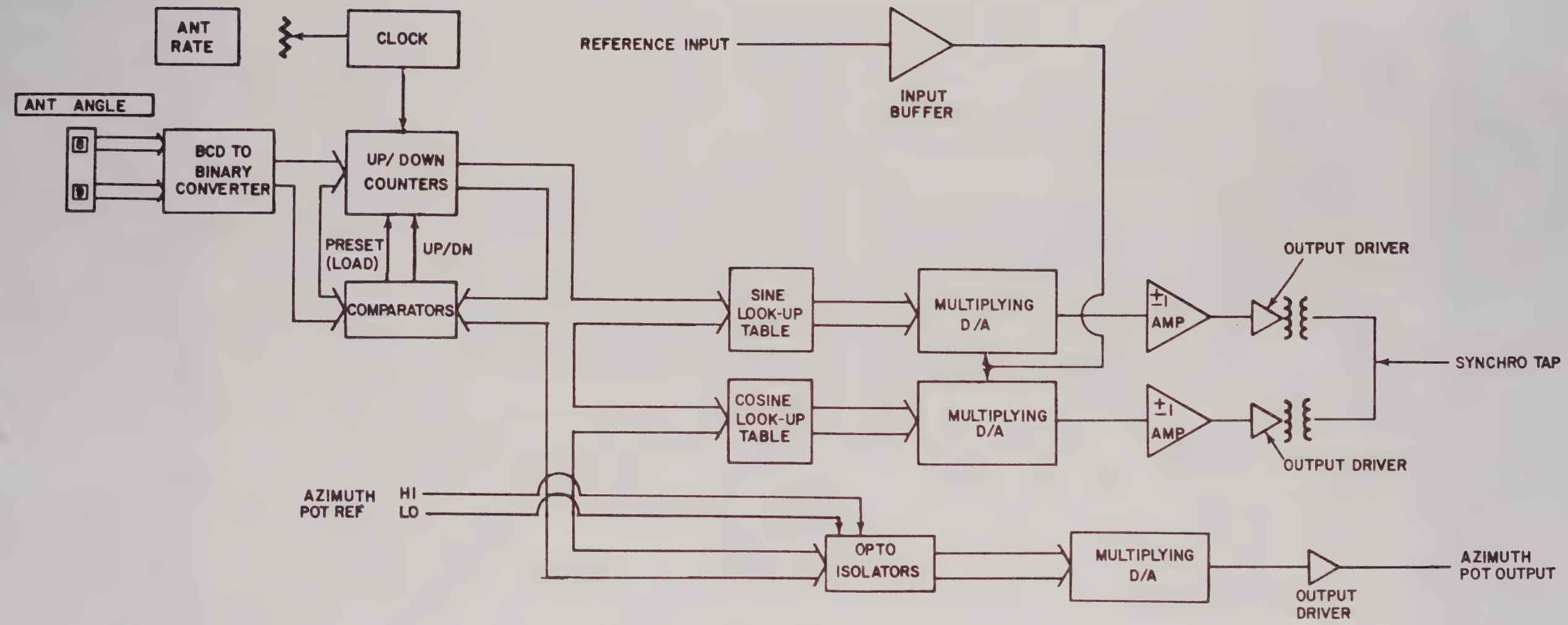
6-5. Transformers T3 & T4 are jumpered from T3 tap #4 to T4-tap #3 to form a Scott connected transformer. This configuration of T3 & T4 converts the two phase resolver output of the bridge amplifiers into the three phases needed for a synchro output to the unit under test.

7-1. D.C. Potentiometer Simulator Output Signal Generation.

7-2. The d.c. Potentiometer Simulator System is connected to a floating power supply. This power supply consists of X40 (CD4047), Q4 (2N2222), Q5 (2N2222), T1, CR8-11 (1N4148) and associated components. This power supply provides ±12 V, ±7 V and a floating ground for the Potentiometer Output Simulator System.

7-3. The Azimuth Hi and Lo voltages which normally connect the cw and ccw arms of the antenna assembly pot are connected to a voltage divider consisting of R18-R20. These resistors total 1K ohms to simulate the KWX-50 azimuth pot. This allows a reduced sample of the azimuth pot voltage to be used as a reference on pin 15 of A/D converter X37 (AD7520). The angle word is applied to the inputs of X37 by X33, X39, X41, X42 and X44 (6N138). X37 etc. are opto-isoltors and are used to isolate the voltages used in the Potentiometer Simulator System from those voltages present in the rest of the RD-300.

7-4. No sine ROM is used in this circuit since a linear sweep is simulated rather than a phased sinewave modulation of the resolver system. A quadrant dependant gain of +1 or -1 is applied to opto-isolators X29 & X35 (4371), analog switches X31 and op amp X36a (5558). The output on X31 pin 10 is buffered by X28 (5558) and is outputted to the center tap of the azimuth pot control of the unit under test.



SERVO SIMULATOR SYSTEM BLOCK DIAGRAM

025-1178-045

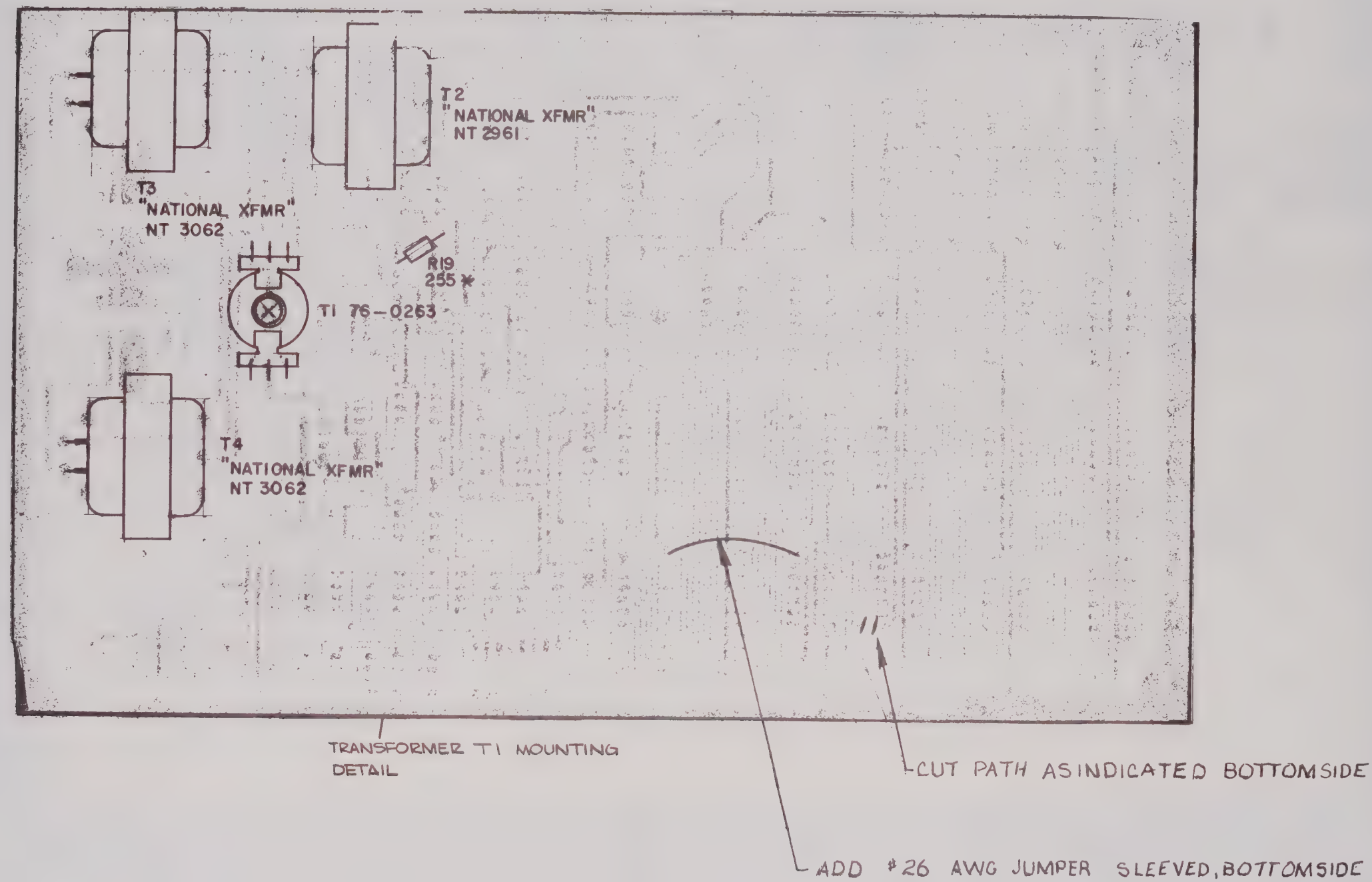


Fig. 8-18-1 SERVO SIMULATOR BOARD PARTS LAYOUT (Bottom View)

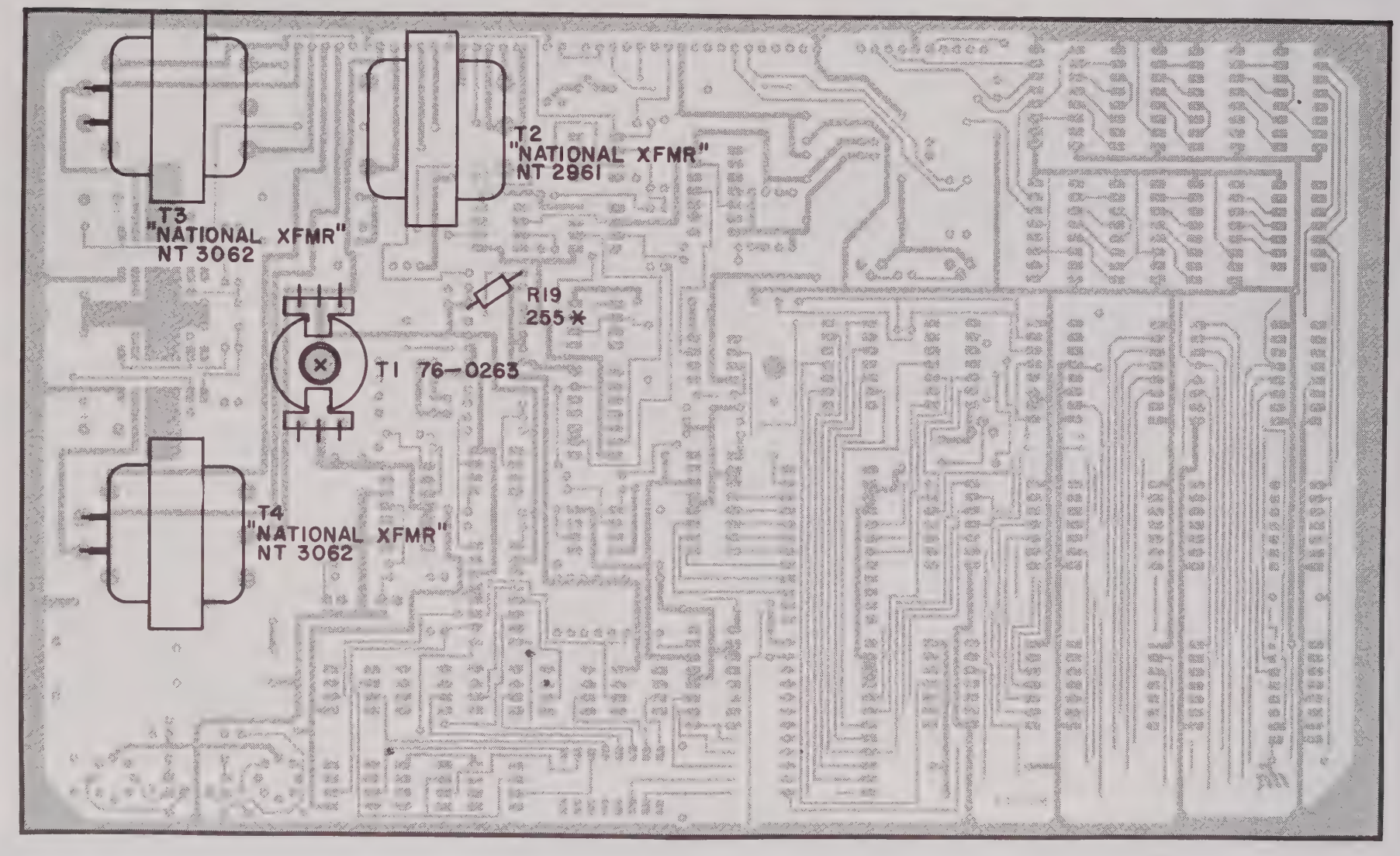


Fig. 8-18 SERVO SIMULATOR BOARD PARTS LAYOUT (BOTTOM VIEW)

DATE	REV	CHANGE	APP'D
12-15-76	A	INCORP. ECN No. 1777 Jnv	
1-17-77	B	INCORP. ECN No. 1881 WW	
3-25-77	C	INCORP. ECN No. 1986 Jnv RKK	
5-20-77	D	INCORP. ECN No. 2059 TJT	
	E	INC ECN 2904 JAJ	

ANTENNA ANGLE B.C.D. SWITCHES

S10A: 1 2 4 8 — S10B: 10 20 40 80 — +12V

P76-1 P76-2 P76-3 P76-5 P76-10 P76-9 P76-8 P76-7 P76-6 P76-4

115V 400Hz INPUTS — P73B — P78-5
26.4V 400Hz OUTPUT — P73A — P78-10
6.6V 400Hz OUTPUT — P73C — P78-1
COMMON — P73E — P78-3
P73F — P78-2

R1 10K

T2 NT2961 (HIGH / LOW)

BCD TO BINARY

X1 CD4008 · X2 CD4008 · X3 CD4008 · X4 CD4008 · X6 CD4008 · X7 CD4008 · X8 CD4008

X9 CD4029 · X10 CD4029 · X5 CD4078

ZERO SENSOR

X15 CD4078 · 1/6 CD4049 · X14d 1/4 CD4001

COMPARATOR

X16 CD4077 · X20 CD4077 · X21 CD4068 · X14c 1/4 CD4001

LSB … MSB

X17 & X22 MM74C902

X11a CD4027

Q5 2N2222 · Q4 2N2222 · R72 15K · R73 10K · R74 10K · X40 CD4047 · C22 .001 DISC · C24 .01 · C23 6.8µf 35v tant. · T1 I 76-0263 (50T 50T 50T) · CR8,9,10,11 1N4148 · C28 .01 · GND.

C26 6.8µf 35v tant. · C25 6.8µf 35v tant. · +12v · -12v · +5v · -7v

R79 3.57K * · R80 4.99K * · R75 470 · R76 715 * · R77 3.57K * · R78 4.99K * · CR12 1N5231

S10 · P77-2 · R2 3.3K · ANTENNA RATE

CLOCK

Q3 2N2222 · R10 33K · R12 4.7K · X14b 1/4 CD4001 · Q6 2N2222 · R4 100 · R5 22K · R6 22K · Q7 2N2222 · R7 270 · C1 .001 · X46 CA3130 · X45 CA3130 · C2 1uf 35v tant · R8 22K · P77-18 · R11 10K · R9 1.2K

R3 27K · R87 10K · R86 2.2K · R11 22K · P77-17 · P73-X GROUND WHEN TESTING "RCA" AVQ-45,-46,-47 · X19 1/6 CD4049

X11b CD4027 · Q2 2N2222 · R13 18K · R14 18K · Q1 2N2222 · R15 4.7K · R83 1K · R16 3.3K · X30b 1/2 5558 · X30a 1/2 5558 · R17 3.3K · CR1 1N4148 · CR2 1N4148 · CR3 1N4148 · CR4 1N4148 · J · K

R81 820 · R82 820

P.C. BD. 3-25-0064

S8 · S9 · P77-8 · P77-9 · P77-7 · P77-6 · DS10 · DS9

ANT. QUADRANT SELECTORS

C17 6.8uf 35V tant. · C27 33 uf 35V tant. · P77-3 · P77-10 · +5v · -24v

part of sheet 2

+12V · +7V · 4.99K * · 3.57K * · 6.8µf 35V · P77-4 · P77-1 · P77-11 · -7V · -12V

LAST USED NO.
X 48
Q 7
CR 12
C 29
R 85

NOTE :
ALL GND. & POWER SYSTEMS MARKED (V' or GND.') ARE ISOLATED FROM SYSTEM POWER & GND.

ITEM	REQ'D	PART NO	DESCRIPTION
1	—	4-25-0112	SERVO-SIMULATOR SCHEMATIC

LIST OF MATERIALS

-IFR INC-
WICHITA KANSAS

TITLE: SERVO SIMULATOR (SCHEMATIC)

DRAWN 8 2-23-76 · CHECKED WJ 2-27-76 · APPROVED 3-1-76

SIZE — PART NUMBER 4-25-0112 — REV E — SCALE — WEIGHT — SHEET 1 OF 2

NEXT ASSY 1-25-0167 · QTY — · MODEL NO-300 · APPLICATION

TOLERANCES: UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH ANGULAR ± DECIMAL ± FRACTIONAL ± REMOVE ALL BURRS

MATERIAL · FINISH

Fig. 8-19-1

DATE	REV	CHANGE	APP'D
		SEE SHT. 1 OF 2	

AZIMUTH POT HIGH P73-T
AZIMUTH POT LOW P73-U
P73-Y POT GND
P78-9
P78-8
P78-7
R18 255
R19 255*
R20 499*
GND'
+5v'
+12v'
-24v
-12v'
-7v'
+7v'
+7v
GND'
SYSTEM GND.

X38 6N-138 R56 6.8K R63 22K
X34 6N-138 R55 6.8K R64 22K
X41 6N-138 R57 6.8K R65 22K
X43 6N-138 R58 6.8K R66 22K
X39 6N-138 R59 6.8K R67 10K
X42 6N-138 R60 6.8K R69 10K
X44 6N-138 R61 6.8K R68 10K
X33 6N-138 R54 6.8K R62 10K
SN7404

X37 AD7520
CR5 HP2800 R24 4.7K
X36b 1/2 5558
X31 1/4 CD4016
R23 10K*
R22 10K*
X36a 1/2 5558
R21 4.7K
X31 1/4 CD4016
R70 47K
X35 6N-139
R29 22K
R71 47K
X29 6N-139
R28 22K
X24 1/4 CD4016
R33 10K*
X32a 1/2 5558
R34 4.7K
R85 10K
R84 6.8K
X24 1/4 CD4016

LSB
MSB
SIN. X23 82S141
COS. X18 82S141
X27 AD7520
X26 AD7520
CR6 HP2800 R31 4.7K
X25b 1/2 5558
CR7 HP2800 R36 4.7K
X25a 1/2 5558
R37 7.68K*
R39 43.2K*
X32b 1/2 5558
R88* 9.53K
R38 6.49K*

R44 1K* C3 4.7uf 35v tant
X47a 1/2 LM1877
C6 150uf 15V tant.
C7 33µf 35v tant
C31 .0047µf mylar
X47b 1/2 LM1877
R45 90.9K*
R47 90.9K*
C10 4.7µf 35v tant
R48 100K*
C8 4.7µF 35V
C4 C5 56µf 6v tant
R46 1K*
C9 .0047
R49 1K*
C13 150uf 15V tant
X48a 1/2 LM1877
R50 90.9K*
C11 C12 56uf 6v tant
R51 1K*
C14 33µf 35v tant
C30 .0047µf mylar
X48b 1/2 LM1877
R52 90.9K*
R53 100K*
C15 47µF 35V
C16 .0047

NT 3062 T3
P78-13 P73H SYNCHRO OUT ø X
P78-18 P73S SINE RESOLVER OUT
P77-15 ROLL P73-b
S5B 2 3 PITCH P73-a
P78-16 P73J SYNCHRO OUT ø Y
P78-17 P73R SINE RESOLVER COMMON
P77-13 P73-P T3-4
NT3062 T4
P78-15 P73M COS. RESOLVER OUT
P78-11 P73K SYNCHRO OUT ø Z
P78-14 P73L COS. RESOLVER COMMON
P78-12 P73Z GND OF SYSTEM ø C
P78-6 P73V AZIMUTH POT CONTL.

R26 29.4K*
R25 9.53K*
X28 5558
R27 7.68K*
P77-4 +12v
R40 3.57K*
C18 6.8µf 35v tant.
C19 6.8µf 35v tant.
R41 4.99K*
P77-1 GND.
C20 6.8µf 35v tant.
R42 4.99K*
R43 3.57K*
P77-11 -12v
C21 5.8µf 35v tant.
P76-6 GND.

part of sheet # 1
P77-10 -24v
33uf 35V TANT
+5v
P77-3
6.8uf 35V TANT

P77-12 P73-N REF. INPUT FOR "RCA" AVQ SERIES RADAR
P78-4 P73-D REF. INPUT ø H
P77-16 P73-W ø SHIFT INPUT

NOTES:
1. ALL GND & POWER SYSTEMS MARKED (V' or GND') ARE ISOLATED FROM SYSTEM POWER & GND.

This drawing incorporates the latest revision as of Dec. '85 printing.

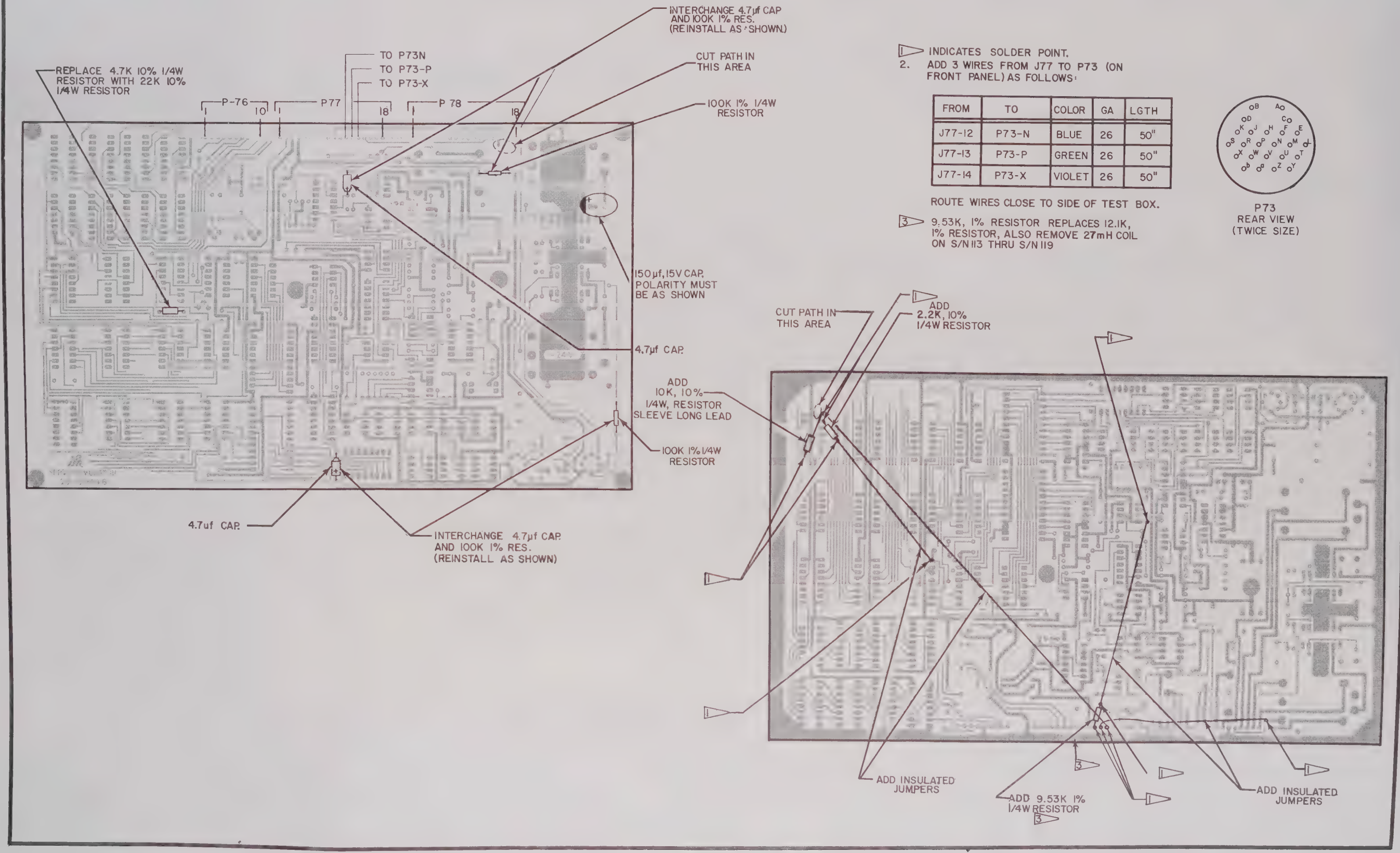
ITEM	REQ'D	PART NO	DESCRIPTION
1	—	4-20-0112	SERVO-SIMULATOR SCHEMATIC

LIST OF MATERIALS

MODEL	NO. 300	TOLERANCES	DRAWN DATE 2-23-76
APPLICATION	—	UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH DECIMALS ± .010 .XXX ± .005 ANGLES ± 1/2° FRACTIONS ± 1/64 SURFACE ROUGHNESS 125 REMOVE ALL BURRS	CHECKED DATE
NEXT ASSY	4-20-0187	MATERIAL	APPROVED DATE
		FINISH	SIZE D PART NUMBER 0000-2511-200 REV C
			SCALE WEIGHT SHEET 2 OF 2

- IFR INC - WICHITA KANSAS
TITLE: SERVO SIMULATOR (SCHEMATIC) 4-25-0112

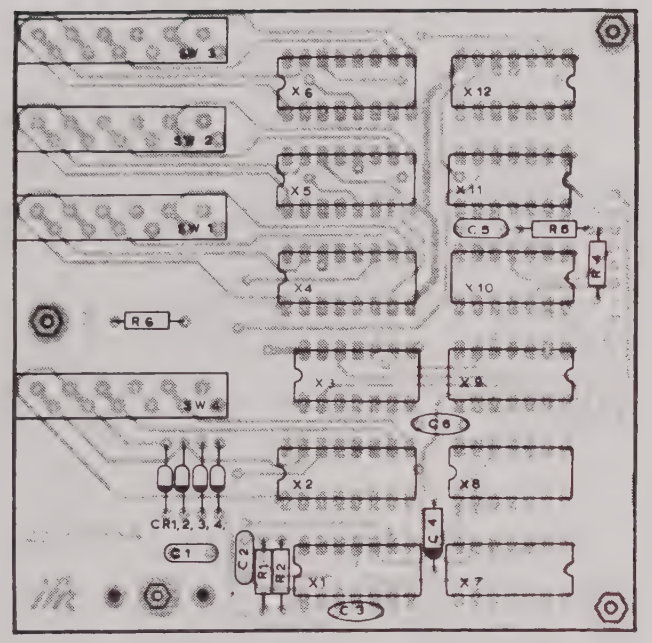
Fig. 8-19-2



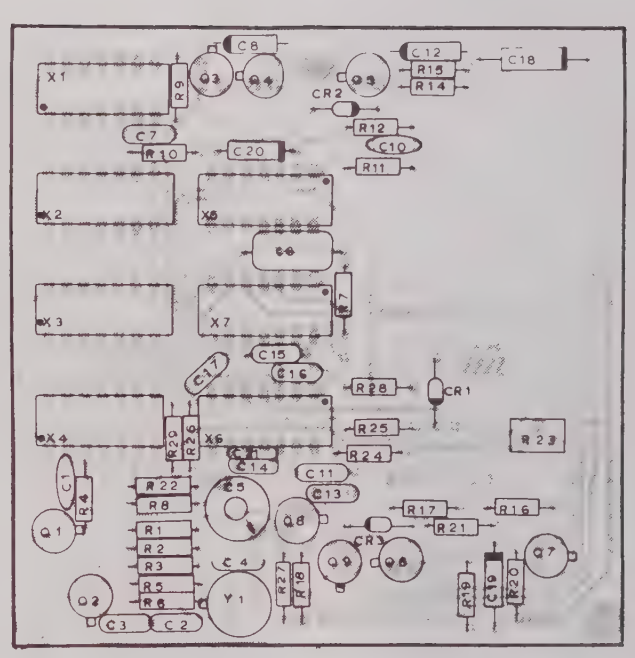
FROM	TO	COLOR	GA	LGTH
J77-12	P73-N	BLUE	26	50"
J77-13	P73-P	GREEN	26	50"
J77-14	P73-X	VIOLET	26	50"

Modification of Servo Simulator Board for RCA AVQ Radar
(Eff: To S/N 119)

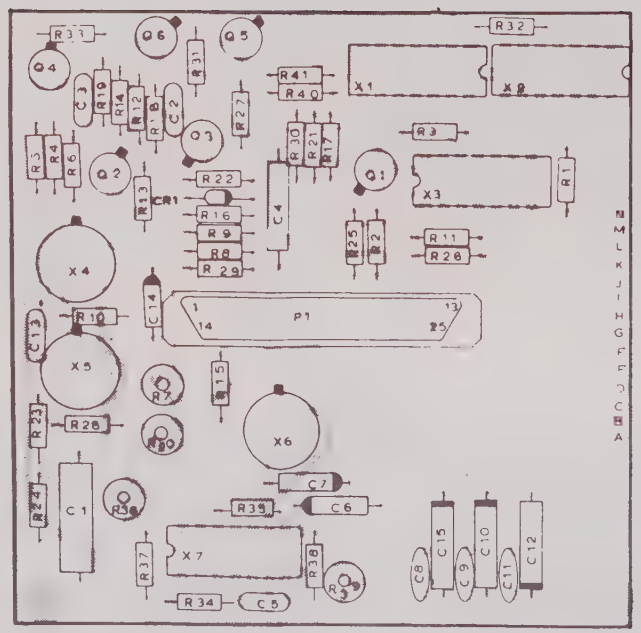
Fig. 8-20



MODULE A



MODULE B



MODULE C

Fig. 8-21 RANGE/CONTOUR MODULES PARTS LAYOUT

RANGE AND CONTOUR BOARD THEORY OF OPERATION

(RD-300)

4-25-100

1-1. Introduction.

1-2. The Range and Contour Board of the RD-300, in conjunction with the MODULATION MODE SELECTOR PUSHBUTTONS, the WIDTH µS CONTROL, the AUX RANGE CONTROL, the µs/NM SWITCH and the PRF Hz CONTROL on the Front Panel, develops a variety of signals used to modulate the IF Amplifier and the output of the VCO Module.

1-3. The Range and Contour Board also produces the 10 kHz clock and PRF inputs for the Digital Counter Assembly, the SYNC signal available at the Front Panel SYNC Jack, and the CONTOUR signal used by the Auxiliary Board.

2-1. TRACK Mode Operation.

2-2. Before any mode is selected on the MODULATION MODE SELECTORS, the inputs to 4-input NAND gate X2b(7420) are high. This causes X2b pin 11 to be at a logic low. When TRACK Mode is selected, X3d pin 13 is brought to +5 V. The ±12 V amplified Detector pulses from the Auxiliary Board are converted to +5 V TTL compatable pulses by Q1 (2N2222) and applied to X3d pin 12. Because X3d pin 13 is high, these pulses are gated and inverted through X3d, to X2d pin 13. X2d gates and inverts these pulses. The output of X2b goes low for the duration of the Detector pulse.

2-3. The output of X2b is applied to the inputs of inverter X3c (7400) for output to the SYNC JACK on the Front Panel, to the CLOCK input of X9b (7473), to the input of the AUX Range one-shot X7 (74121) and is outputted on J4 pin 3 as the PRF input to the Digital Counter Assembly.

3-1. Range Counter Operation.

3-2. The range counter of the Range and Contour Board is used in conjunction with the RANGE SELECTOR THUMBWHEELS, the RANGE RINGS SELECTOR THUMBWHEEL, the µs NM SWITCH and the AUX RANGE CONTROL on the Front Panel to control the radar target range rings on the radar unit under test.

3-3. X1a, X1b (7400), Y1 and associated components form a 3.2365 MHz oscillator that is used when the delay in the radar target range rings is to be measured in terms of nautical miles, NM. In this circuit, each output pulse of the 3.2365 MHz oscillator corresponds to 1/40 of a nautical mile. The squarewave output of the 3.2365 MHz oscillator is applied to X1d pin 13. When the Q output of X9b pin 9 is high, the 3.2365 MHz clock is gated through X1d and applied to

3-3. a divide-by-four circuit. This divide-by-four circuit consists of X7a and X7b (7473). Each output pulse of X7b pin 13 is equivalent to 1/10 NM. The output of X7b is applied to X10d pin 13 (7400). When MILES is selected on the µs NM SWITCH, S1; X10d pin 12 and X10a pins 1 & 2 (7400) float high. At this time, the output of X7b is gated through X10d to X10c pin 10 (7400) and X10a pin 3 goes low. With X10a pin 3 low, X10b pin 6 goes high. Since X10b pin 6 is high, the clock output of X7b is gated through X10c to the input of divide-by-ten counter X8 (7490). Each output pulse on X8 pin 11 corresponds to a range of 1 nauticle mile.

3-4. The divide-by-10 output of X8 is applied to pins 1 & 2 of inverter X3a (7400). When MILES is selected on S1, the output of X8 is applied to serially-connected decade down-counters X4, 5 & 6 (74190). These counters are loaded with BCD range information from the three RANGE SELECTOR THUMBWHEELS on the Front Panel. When X4, 5, 6, & 8 reach a zero count, X3d and X12a pins 1, 2 & 5 go high. When X8 pin 9 goes high, X3d pin 11 goes low. This low on X3d pin 11 is inverted by X3c (7400) and the high logic level output of X3c is applied to X12a pin 4. Since X12a pins 1, 2, & 5 are high, the high output of X3c causes X12a pin 6 to go briefly low.

3-5. This low logic level output pulse from X12a pin 6 is applied to X1c pin 9 and resets counter X8. The low logic level output pulse from X12a is also applied to pin 11 of X4, X5 & X6 and to X11 pins 4 & 3 (74121). This pulse causes X4, 5 & 6 to be loaded with new BCD range information from the RANGE SELECTOR WHUMBWHEELS. The output pulse of X12a also triggers 7µs range one-shot X11.

3-6. The Q output of X11 is used to clock range rings down counter X2 (74190). X2 is used to count the output pulses of X11. When the Q output of X9b goes low, X2 pin 11 of the range rings down counter goes low. This loads X2 with BCD range rings command information from the RANGE RINGS SELECTOR THUMBWHEEL on the Front Panel. As output pulses from X11 are applied to X2, it counts down to zero. When a zero count is reached X2 pin 12 goes high. With X2 pin 12 high, a low is applied to X9b pin 6 via inverter X3b (7400). This resets X9b, X7a & X7b and causes the Q output of X9b to go low. With X9b reset, the 3.2365 MHz oscillator output is not gated through X1d. This stops the range counter. Range count resumes when the next clock pulse from X2b is applied to X9b pin 5.

3-7. Operation of the range counter when the µs NM SWITCH, S1, is in the µs position is simular to the above. In this mode of operation, the clock pulses are derived from a 10 MHz oscillator consisting of a 10.0 MHz crystal, transistors Q2, Q3 (2N3905) and I.C. X4a (7402). When the µs NM SWITCH is in the µs position, X10a, pins 1 & 2 are pulled to ground, X10d pin 11 and X10a pin 3 are high. At this time, the clock output pulses from X7b pin 13 are not gated through X10d. With X10a pin 3 and X10d pin 11 high, the 10 MHz clock signal is gated through X10b and X10c

3-7. to X8 pin 14. From this point, operation of the range counter is the same as described earlier.

4-1. Range Mode Operation.

4-2. With from 1 to 9 range rings selected on the RANGE RINGS SELECTOR THUMBWHEEL and the CONTOUR dB CONTROL in the OFF, detent, position; Q6 (2N222) is turned ON via a CR-1-CR4 (1N4148). With Q6 ON; X4c pin 8 (7402), the base of Q7 (2N3251A), X4b pin 6 (7402) and X7 pin 5 (74121) are pulled low. Since the CONTOUR dB CONTROL is OFF, X4c pin 9 is high. With X4c pin 8 low and 14c pin 9 high, one-shot X5 (74121) is disabled by a low on X5 pin 5, likewise, one-shot X7 is disabled by a low on X7 pin 5.

4-3. With the CONTOUR CONTROL OFF, X4b pin 5 floats high. At this time, X4b pin 4 is low. This turns Q9 (2222) OFF. X6 pin 5 (74121) is then pulled toward +5V by R25. In this mode of operation, only one shot X6 is used.

4-4. With Q6 ON, Q7 & Q8 (2N3251A) are also turned ON. This causes the timing capacitance of X6 to consist of C11, C13, C14 & C21. When X6 is triggered by the $\overline{Q}$ output of X11 of board A, X6 outputs a pulse. This pulse is gated and inverted by X4 (7402) and applied to buffer drive transistors Q3, Q4 (2N3903) and Q5 (2N3905). The modulation output of Q3-5 is routed to the IF Amplifier, the Main Diode Switch and to the DELAYED SYNC CONNECTOR on the Front Panel. The width of the output from X6 may be adjusted by use of the WIDTH µs CONTROL on the Front Panel.

5-1. Contour Modulation.

NOTE:

CONTOUR modulation may be used only when 1 to 9 range rings are selected on the RANGE RINGS THUMBWHEEL on the Front Panel.

5-2. When CONTOUR modulation is selected by moving the CONTOUR dB CONTROL from the OFF, detent, position; X4c pin 9 and X4b pin 6 to go low. At this time, one-shots X6 & X7 are disabled and one-shot X5 is enabled by a high level on X5 pin 5. X5 is triggered by the $\overline{Q}$ output of X11 to produce the Contour Modulation 270µs Output Pulse on X5 pin 6. This pulse is gated and inverted through X4d to the input of buffer amplifier output transistors Q3-Q5.

6-1. AUX Range Operation.

6-2. When the AUX Range function is selected by dialing AUX on the RANGE RINGS SELECTOR THUMBWHEEL, Q6 is turned OFF. With Q6 OFF, X4c pin 8, the base of Q7, X4b pin 6 and X7 pin 5 are pulled high. At this time one-shot X5 is disabled by a low logic level

on X5 pin 5 and one-shot X6 & X7 are enabled by high levels on X6 pin 5 & X7 pin 5. Because Q6 is turned OFF, Q7 & Q8 are also biased OFF and the timing capacitance for X6 consists of C21 & C14. One-shot X7 is triggered by the output pulse of X2b of board C. The duration of the X7 output pulse is controlled by AUX RANGE CONTROL, R10 on the Front Panel.

6-3. The output of X7 is used to trigger one-shot X6. X6 is triggered when the positive going output pulse from X7 falls to a low level. The range delay of the X6 output is dependent on the duration of the output pulse from X7. The pulse width of the output of X6 may be adjusted by use of the WIDTH µs CONTROL on the Front Panel.

7-1. EXT SYNC Operation.

7-2. The EXT SYNC signal from the EXT CONNECTOR, J66, is used to drive complimentary transistors Q5 (2N3903) and Q6 (2N3905). The output of Q5 is applied directly to an input of EXT+ NAND gate X1c (7400). The output of Q6 is inverted and applied to an input of EXT- NAND gate X1b (7400). When EXT+ or EXT- is selected by the proper MODULATION MODE SELECTOR PUSHBUTTON, further operation of the Range and Contour Board is as described previously.

8-1. Internal PRF Operation.

8-2. The internal PRF signal is derived from an oscillator consisting of two voltage comparator op amps X4 & X5 (CA3130), associated components and a flip-flop. A biasing voltage is applied to the inverting (-) input via the PRF Hz CONTROL on the Front Panel. PRF pulse cycle begins with switching transistor Q2 (2N2222) biased OFF. At this time, C1 begins to charge until the voltage across it exceeds the reference voltage on X4 pin 2. When this voltage is large enough the output of X4 pin 6 goes high. This triggers the flip-flop. The flip-flop causes the collector of Q4 to go low and turn Q2 ON. At this time, C1 is discharged through Q2. When the voltage across C1 goes below a certain level X5 is triggered and its output on X5 pin 6 goes high, this triggers the flip-flop. When the flip-flop is triggered by X5, Q3 turns ON and turns Q2 & Q4 OFF. At this time, the output on the collector of Q4 goes high and the cycle repeats.

8-3. The output of the PRF oscillator is applied to one input of NAND gate X1d (7400). When INT is selected by the proper MODULATION MODE SELECTOR PUSHBUTTON, further operation of the Range and Contour Board is as described previously.

9-1. CW Operation.

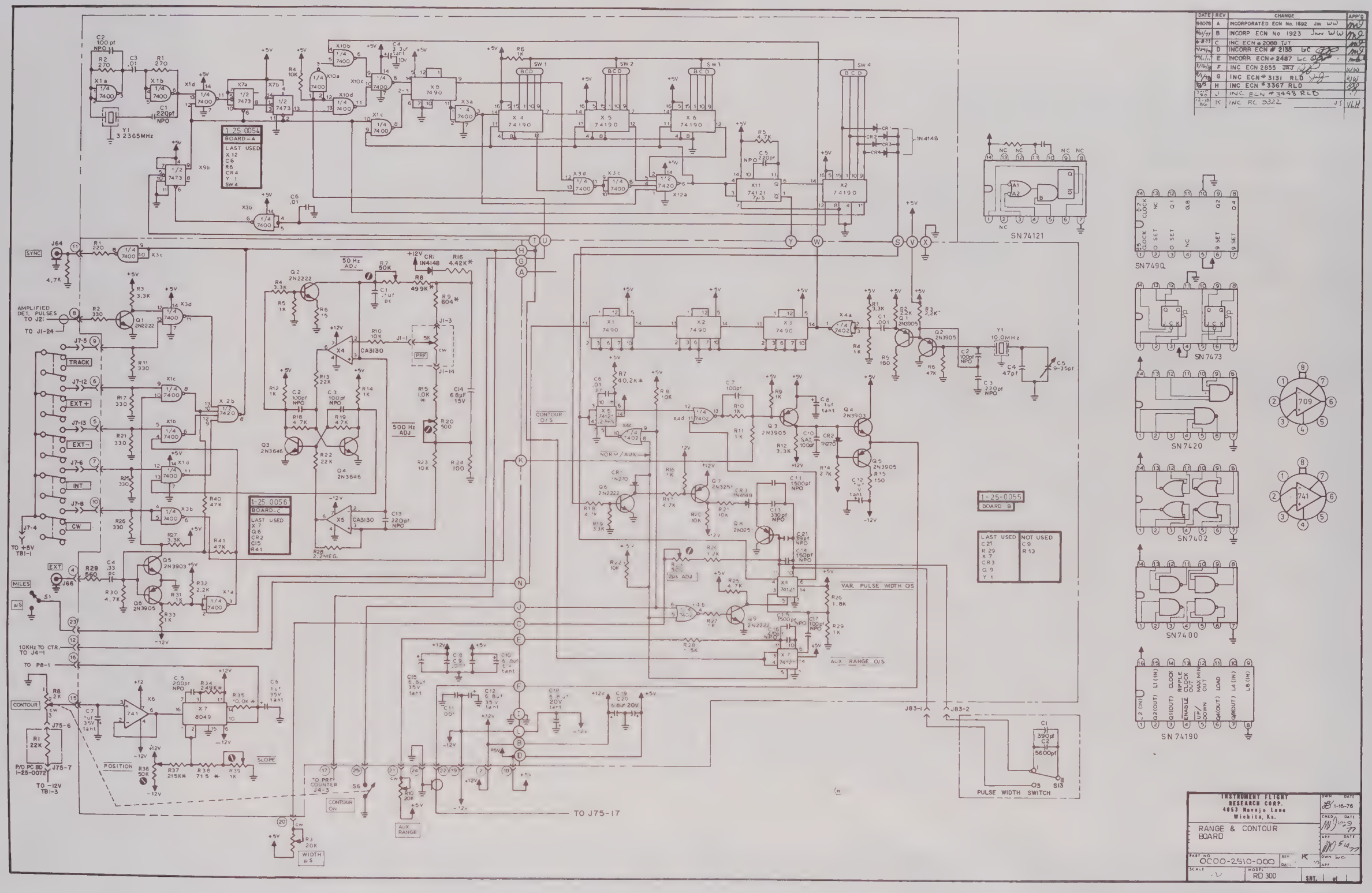
9-2. When CW is selected on the proper MODULATION MODE SELECTOR PUSHBUTTON, X3b pin 6 (7400) goes low. This biases the output driver transistors to produce a continous output.

10-1. Contour Circuit Operation.

10-2. The CONTOUR dB CONTROL pot provides a linear biasing voltage to the noninverting (+) input of X6 (741). The output of buffer X6 is applied to a logarithmic amplifier X7 (8049). The output of X7 is outputted to the CONTOUR input of the auxiliary PC Board. During calibration, the slope of the response of X7 may be adjusted by SLOPE pot R39.

11-1. 10 kHz Clock.

11-2. The 10 kHz oscillator on the Range and Contour board is derived from the 10 MHz oscillator. The 10 MHz output of the oscillator is downcounted by serially-connected divide-by-ten counters X1-X3 (7490) to provide the 10 kHz output.



INSTRUMENT FLIGHT RESEARCH CORP.
4853 Navajo Lane
Wichita, Ks.
RANGE & CONTOUR BOARD
PART NO. 0C00-2510-000
MODEL RD 300
1-25-0054 BOARD-A
1-25-0056 BOARD-C
1-25-0055 BOARD B
SN74121
SN7490
SN7473
SN7420
SN7402
SN7400
SN74190
PULSE WIDTH SWITCH
VAR. PULSE WIDTH O/S
AUX. RANGE O/S
CONTOUR O/S
TO J75-17

Fig. 8-22-1

DATE	REV	CHANGE	APP'D
9-5-75	A	INCORPORATED ECN No 1692 JMW WW	
4-1-77	B	INCORP ECN No 1923 JMW WW	
4-8-77	C	INC ECN # 2088 TJT	
7-29-77	D	INCORR ECN # 2135 WC	
1-11-78	E	INCORP. ECN # 2487 LC	
3-16-78	F	INC ECN 2855 JAJ	
8-1-78	G	INC ECN # 3131 RLD	
10-5-78	H	INC ECN # 3367 RLD	
3-15-79	J	INC ECN # 3498 RLD	

This drawing incorporates the latest revision as of Dec. '85 printing.

INSTRUMENT FLIGHT RESEARCH CORP. 4853 Navajo Lane Wichita, Ks.

RANGE & CONTOUR BOARD

PART NO. 0-100-0510 000 REV. J

SCALE 1/1 MODEL RD 300 SHT. 1 of 1

DWN B 1-16-76

CHKD MW 3-29-77

APP MW 5-19-77

Fig. 8-22

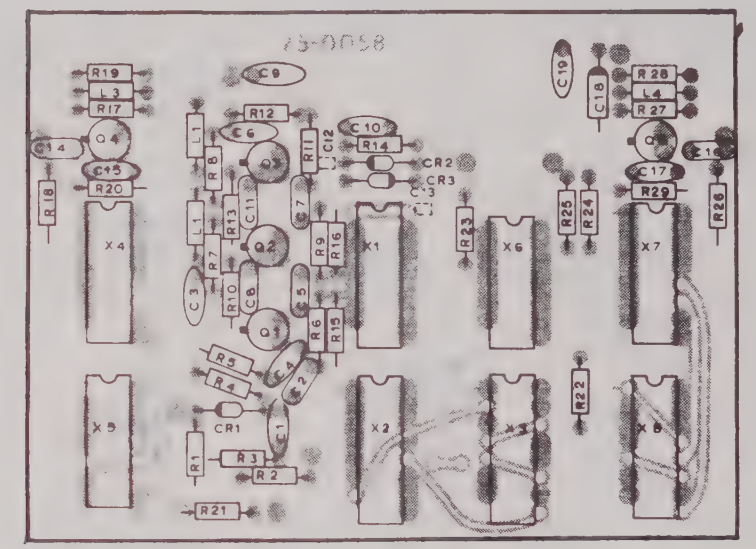


Fig. 8-23 MARKER PRE-SCALER BOARD PARTS LAYOUT

MARKER PRESCALER THEORY OF OPERATION

RD-300

(3-25-104)

1-1. Introduction.

1-2. The Prescaler System of the RD-300 provides prescaled MARKER, RF and IF frequencies to the Digital Display Assembly. Selection between RF prescaled output and IF Prescaled output is controlled by the Front Panel IF MODE SELECTOR PUSHBUTTON.

2-1. Prescaled RF Processing.

2-2. The L-Band VCO sample at J47 is mixed-down 900 MHz by CR1 (HP2800). This is done by beating the 1045-1175 MHz VCO sample frequency with the 900 MHz output of the Local Oscillator (LO). The output of this mixer is 145-275 MHz. Transistors Q1-Q3 (2N5179) and associated components filter and amplify the output of the mixer to the level (≈0 dBm) needed by X1 (MC12013). X1 is a high speed divide-by-10 or 11 prescaler. Pins 9-13 of X1 are tied to the +5V supply so that the prescaler operates in the divide-by-10 mode only. Because the voltage swing of an ECL logic level transition is small, about 0.85V typ.; the clock input line X1 pin 15 is tied to the biasing reference voltage on pin 14. CR2 & CR3 (HP2800) are clipping diodes which limit the amplitude of the input signal swing to ± a diode gap of the reference voltage V_{bb} on X1 pin 14.

2-3. The output of X1 on pin 16 is applied to the input of a divide-by-two flip-flop X2a(74S112). The Q output of X2a is used to clock a divide-by-five walking-ring counter. This counter consists of X2b, X3a, and X3b(74S112).

2-4. When prescaled RF is selected by the RF MODE SELECTOR PUSHBUTTON on the Front Panel, X6d pins 12 & 13 and X6a pin 10 are at a low logic level. This causes X6a pin 8 and X6d pin 11 to go high. With these pins high, the prescaled output on X3b pin 9 is gated through X6c and X6b to the Digital Display Assembly. R23 and L6 prevent L-Band sample frequencies from being outputted on P44.

3-1. Prescaled IF Processing.

3-2. The IF sample at J48 is amplified by Q5 (2N5179) and applied to a divide-by-two stage X7a (74S112). The Q output of X7a is used to clock a divide-by-five walking ring counter. This counter consists of X7b, X8a and X8b (74S112).

3-3. When prescaled IF is selected by the IF MODE SELECTOR PUSHBUTTON on the Front Panel, X6d pins 12 & 13 and X6a pin 10 are at a high logic level. This causes X6d pin 11 to go low and blocks the prescaled RF from being gated thru X6c. With X6a pin 10 high, the prescaled IF is gated through X6a and X6b to the Digital Display Assembly.

4-1. Prescaled MARKER Processing.

4-2. Prescaling of MARKER frequencies is the same as for IF frequencies. The prescaled MARKER signal is applied directly to the Digital Display Assembly.

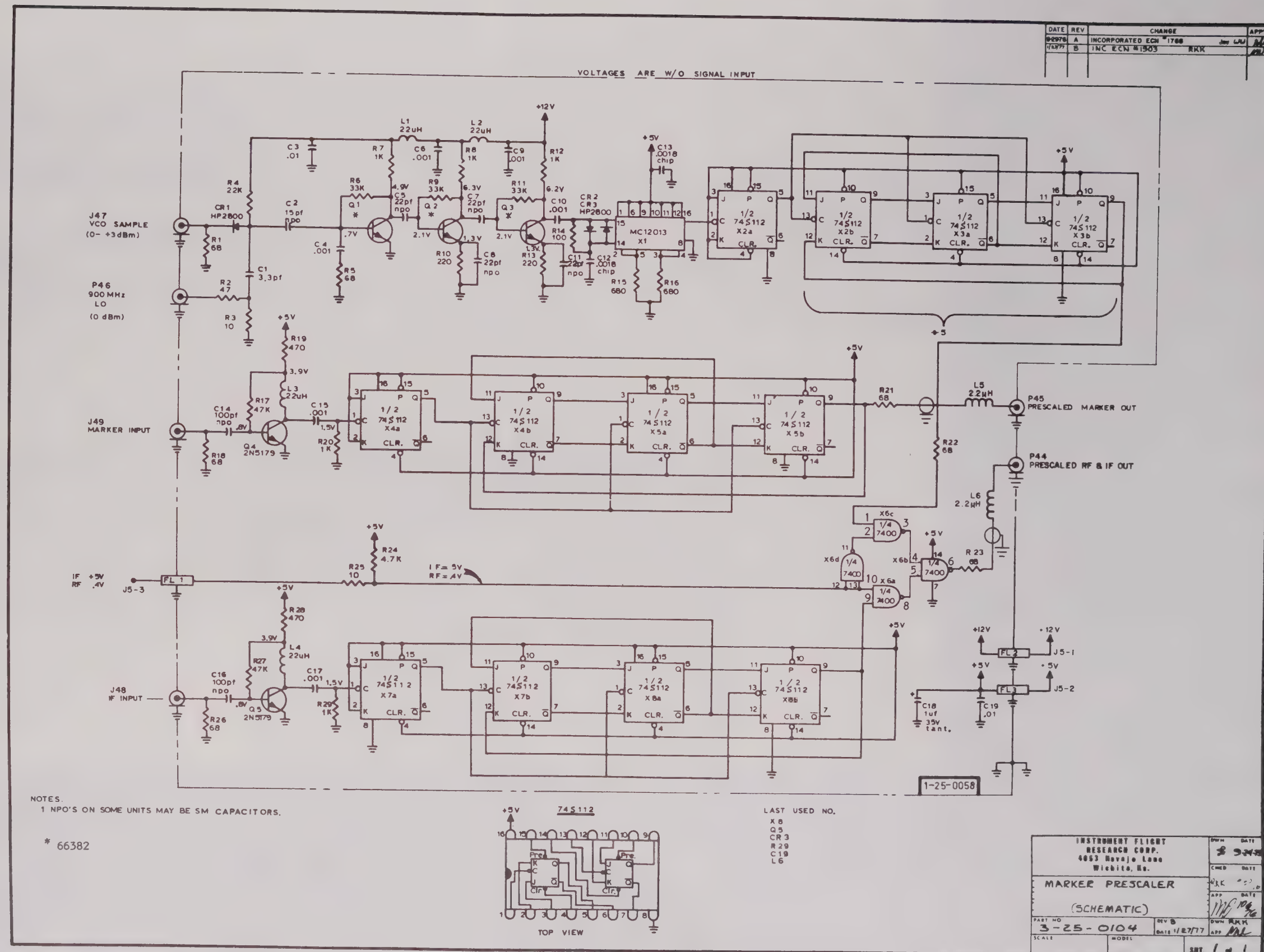
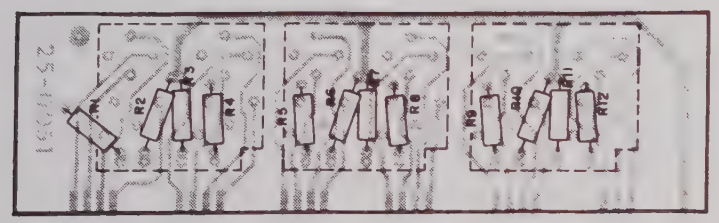
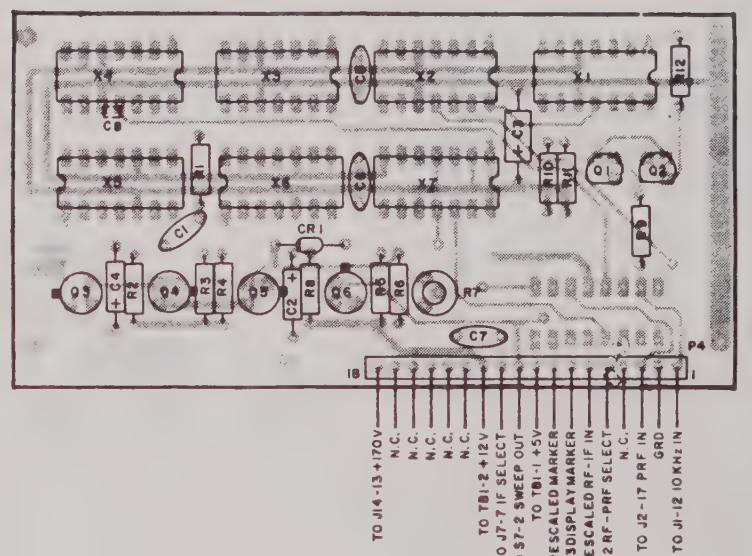

VOLTAGES ARE W/O SIGNAL INPUT
J47 VCO SAMPLE (0- +3dBm)
P46 900 MHz LO (0 dBm)
J49 MARKER INPUT
J48 IF INPUT
IF +5V RF .4V
J5-3
FL 1
IF= 5V RF= .4V
MC12013 X1
1/2 74S112 X2a
1/2 74S112 X2b
1/2 74S112 X3a
1/2 74S112 X3b
1/2 74S112 X4a
1/2 74S112 X4b
1/2 74S112 X5a
1/2 74S112 X5b
1/2 74S112 X7a
1/2 74S112 X7b
1/2 74S112 X8a
1/2 74S112 X8b
X6a
X6b
X6c
X6d
1/4 7400
P45 PRESCALED MARKER OUT
P44 PRESCALED RF & IF OUT
J5-1
J5-2
FL 2
FL 3
C18 1uf 35V tant.
C19 .01
1-25-0058
NOTES.
1 NPO'S ON SOME UNITS MAY BE SM CAPACITORS.
* 66382
74S112
TOP VIEW
LAST USED NO.
X8
Q5
CR3
R29
C19
L6
INSTRUMENT FLIGHT RESEARCH CORP.
4053 Navajo Lane
Wichita, Ks.
MARKER PRESCALER
(SCHEMATIC)
3-25-0104
REV B
DATE 1/27/77
SHT. 1 of 1

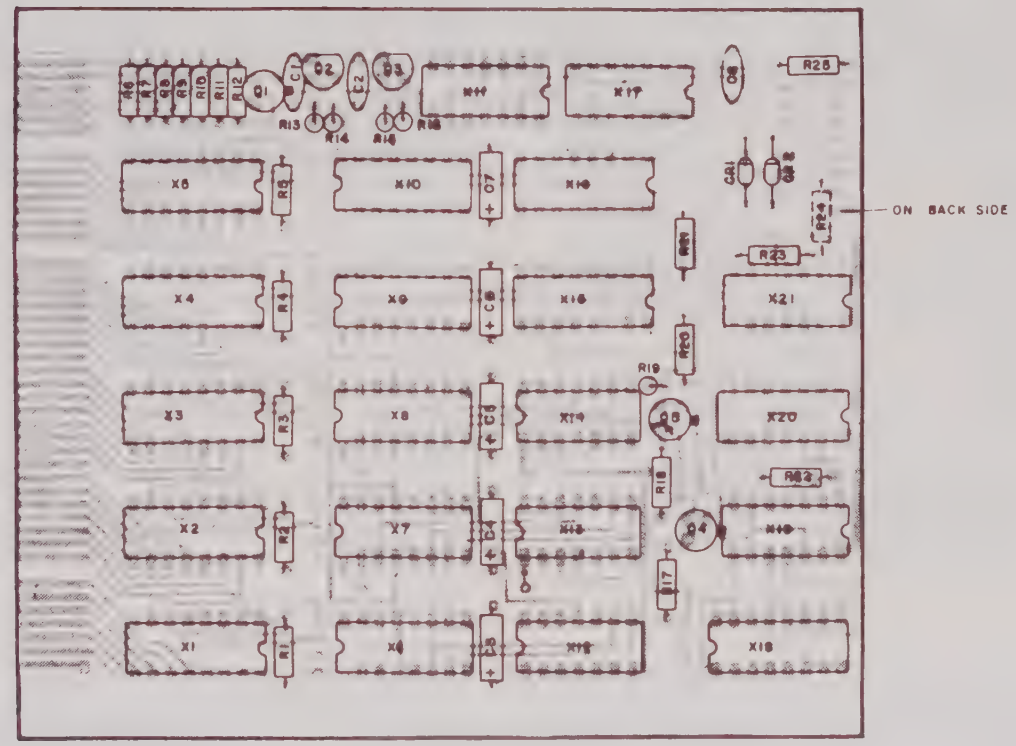
Fig. 8-24



COUNTER DISPLAY BOARD
(7010-2517-800-B)



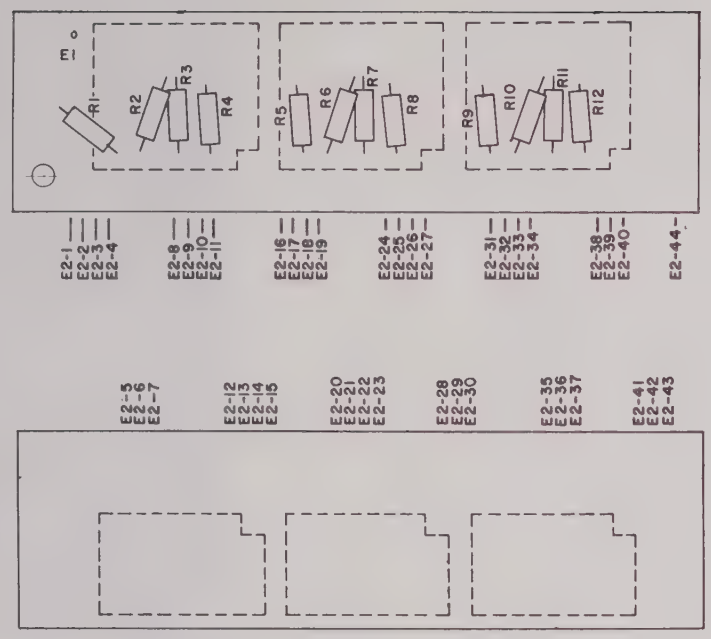
COUNTER GATING BOARD
(7010-2518-000-D)



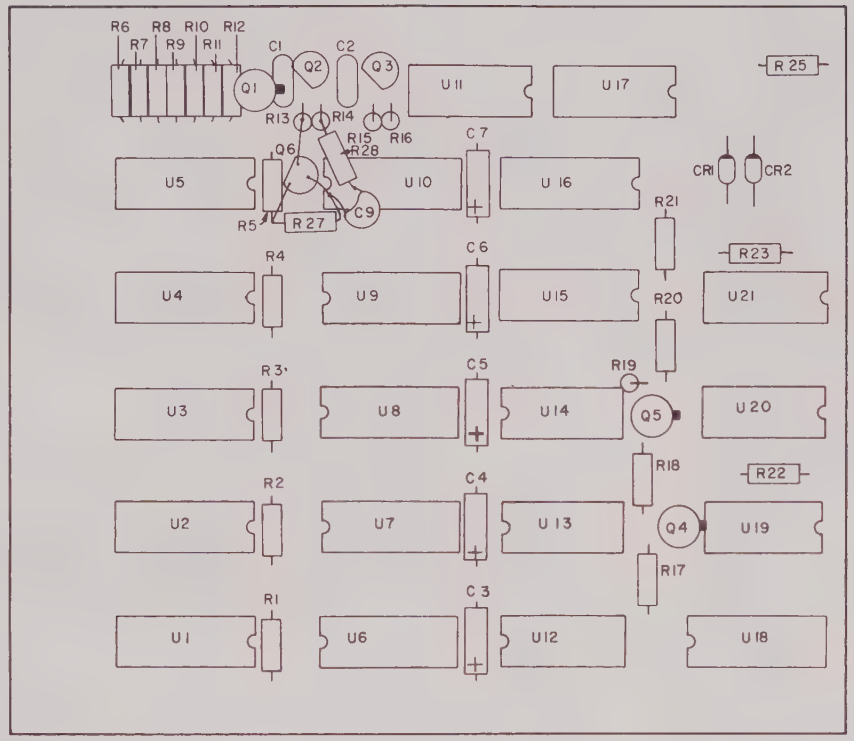
COUNTER LOGIC BOARD
(7010-2517-900-E)

Fig. 8-25 DIGITAL COUNTER ASSEMBLY PARTS LAYOUT

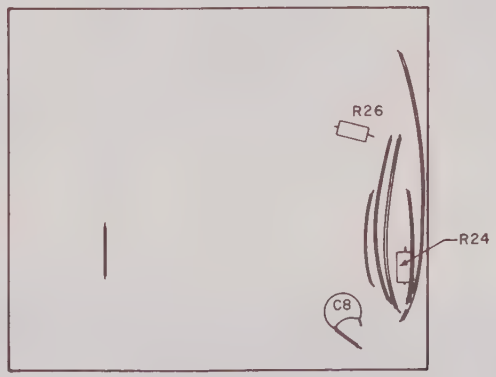
025-1178-044



COUNTER DISPLAY BOARD
(7010-2517-800-C)

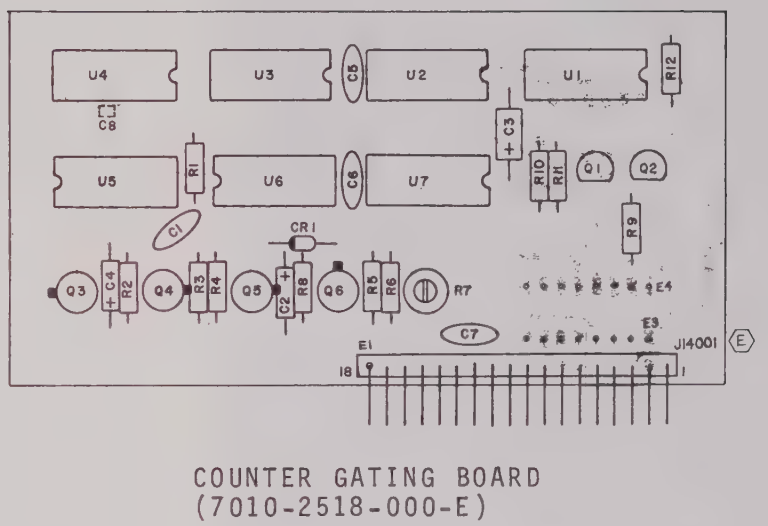


TOP VIEW



BOTTOM VIEW

COUNTER LOGIC BOARD
(7010-2517-900-F)



COUNTER GATING BOARD
(7010-2518-000-E)

Fig. 8-25-1 DIGITAL COUNTER ASSEMBLY PARTS LAYOUT

DIGITAL COUNTER ASSEMBLY THEORY OF OPERATION

RD-300

(3-25-102)

1-1. Introduction.

1-2. The Digital Counter Assembly provides a display of the PRF of the radar unit under test. It provides a display of the RD-300's prescaled IF, MARKER and L-Band VCO frequency. The Digital Counter Assembly also contains time base dividers and a sweep generator for the IF Oscillator.

3-1. Counter Gating Board Operation.

3-2. A 10 kHz squarewave input on J4 pin 1 is used to derive the gating signals used in the Digital Counter Assembly. This 10 kHz squarwave is applied to a pulse conditioning circuit consisting of Q1, Q2 (2N3646) and associated circuitry. Q1 & Q2 buffer and sharpen the waveform before it is applied to the gating counter. X1-X2 (7490) divide the 10 kHz input by 100 to provide a 100 Hz gate for RF or IF counting. The 100 Hz output is further divided by 100 by X3 & X4 (7490) to provide a 1 Hz gate for PRF counting. Chip capacitor C8 prevents a race glitch from causing false clocking of X18b on the Counter Logic Board.

3-3. A divide-by-10 counter X5 (7490) and a divide-by-5 counter X6 (7490) are used to provide a 2 Hz pulse with a 20% duty cycle. This pulse is used to reduce the ambiguity of the least significant display digit.

3-4. The Sweep Ramp Output is developed from the 100 Hz clock pulse by Q3, Q4 (2N222) Q5, Q6 (2N3241A) and associated components. Q3 & Q4 are negative edge triggered by the clock pulse to produce a short reset pulse. This reset pulse causes Q4 to turn ON. With Q4 ON, C2 is charged linearly by a constant current source Q5. The peak amplitude is adjusted by R7. The sweep ramp output of Q4 & C2 is buffered by Q6.

4-1. Counter Logic Board Operation.

4-2. The prescaled RF/IF input on J4 pin 6 applied to X20 pin 1. When switch S5A is in the RF position, X20 pins 2, 12 & 13 are pulled toward +5 V by R22. With X20 pins 12 & 13 high, X20 pin 11 goes low. This causes X20 pin 4 to go low. At this time, the PRF input on J4 pin 3 is blocked from being inputted by the counter. With X20 pin 2 high and the DISPLAY MKR SWITCH not depressed, the prescaled RF/IF input is gated thru X20, X17a and X17c. The output of X17c is applied to X11 pins 2, 3, & 12.

4-3. The output of X17c is applied to one input of X11d directly and to the other input of X11d via the other three gates of X11, used as inverters. The output X11d pin 13 is a series of negative going pulses of the same frequency as the RF/IF input. The pulse width of the pulses on X11 pin 13 is equivalent to the sum of the propagation delays of the three inverters. The use of very narrow pulses improves the last digit accuracy of the counter.

4-4. When S5A is in the PRF position, X20 pins 2, 12, & 13 are pulled low. This causes the prescaled RF/IF to be blocked from the counter input. At this time, the PRF input is gated thru X20, X17a, X17c & X11 to X19c pin 9.

4-5. When the DISPLAY MKR SWITCH on the Front Panel is depressed, X21d pins 12 & 13 and X21a pin 2 are pulled high. This causes X21d pin 11 to go low and blocks the RF/IF or PRF output of X20 pin 8 from being gated to the counter input. At this time, the Prescaled MARKER signal is gated thru X21a, X17c and X11 to X19c pin 9.

4-6. With S5A in the RF position, X19 pin 1 is pulled high and X19 pin 4 is low. This allows the 100 Hz gating clock from X2 pin 11 to be applied to X19b pin 13, and X18b (74S112).

4-7. If S5A is set to the PRF position, X19 pin 4 is pulled high and X19 pin 1 is low. This allows the 1 Hz gating clock from X4 pin 11 to be applied to X18b pin 13.

4-8. X19c (7400) allows the RF/IF or PRF pulses to be counted only when the Q output of J-K flip-flop X18b (74S112) is high. Thus, X18b provides the counting gate for the counters. At the end of two clock cycles from X2 pin 11 or X4 pin 11, the Q output of X18b goes low. This triggers one-shots Q2 & Q3 (2N3646). With Q of X18b low, Q2 is turned OFF. This causes the output of Q2 to go high. At this time, Q2 pulls the ENABLE lines of latches X6-X10 (7475) high and allows the outputs of counters X12-X14 (7490), X15-X16 (74190) and X18a (74S112) to be loaded into latches X6-X10 (7475). X21c (7400) is used to invert the clock input to X15 pin 14 from X14 pin 11. This is done because X15 (74190) is a positive edge triggered I.C. and X14 (7490) is negative edge triggered.

4-9. After about 30µs, Q2 triggers Q3. Q3 causes counters X18a, X12, X13, X14, X15 and X16 to be reset to zero before beginning another count cycle. C8 delays the rising edge of the output of Q3. This causes the load command to the latches X6-X10 to go low just before the counters are reset to zero by X19c. When PRF mode is selected on S5A, X15 pins 10 & 15 and X16 pin 15 are brought to a low level. This causes X15 & X16 to be loaded with binary zero at the start of a count cycle.

4-10. In the RF mode, IF MODE SELECTOR SWITCH not depressed; the base of Q1 (2N2896) is pulled high by R21. This turns Q1 ON and allows the 6th counter digit (GHz) to become illuminated. The 6th digit is hard-wired to display a 9. The high logic level also causes X16 to be loaded with a 1 and X15 to be loaded with a binary 5. This causes the counter to start counting up from 9150.00 MHz. The 9150 MHz load value is a result of the 8250 MHz frequency offset at the X-Band Front End and the 900 MHz offset in the Mixer-Prescaler.

4-11. In this display mode (RF), X17d pin 13 (7400) is high. This causes X17d pin 11 to go low and turns Q5 (2N2896) OFF. This turns Decimal #3 OFF and Q4 (2N2896) is biased to turn ON. Since X20 pin 11 is low, Display Board decimal #2 is turned ON.

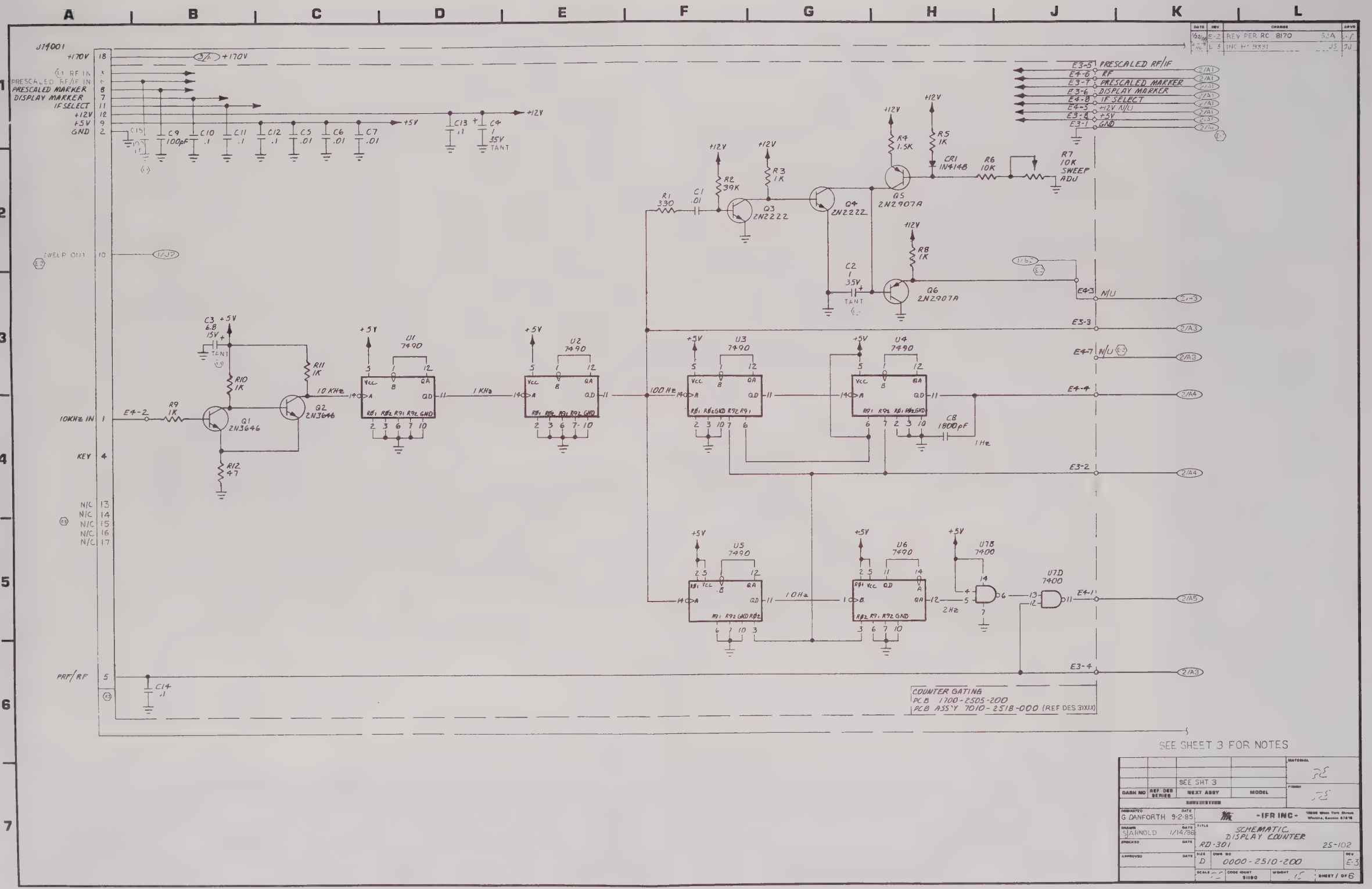
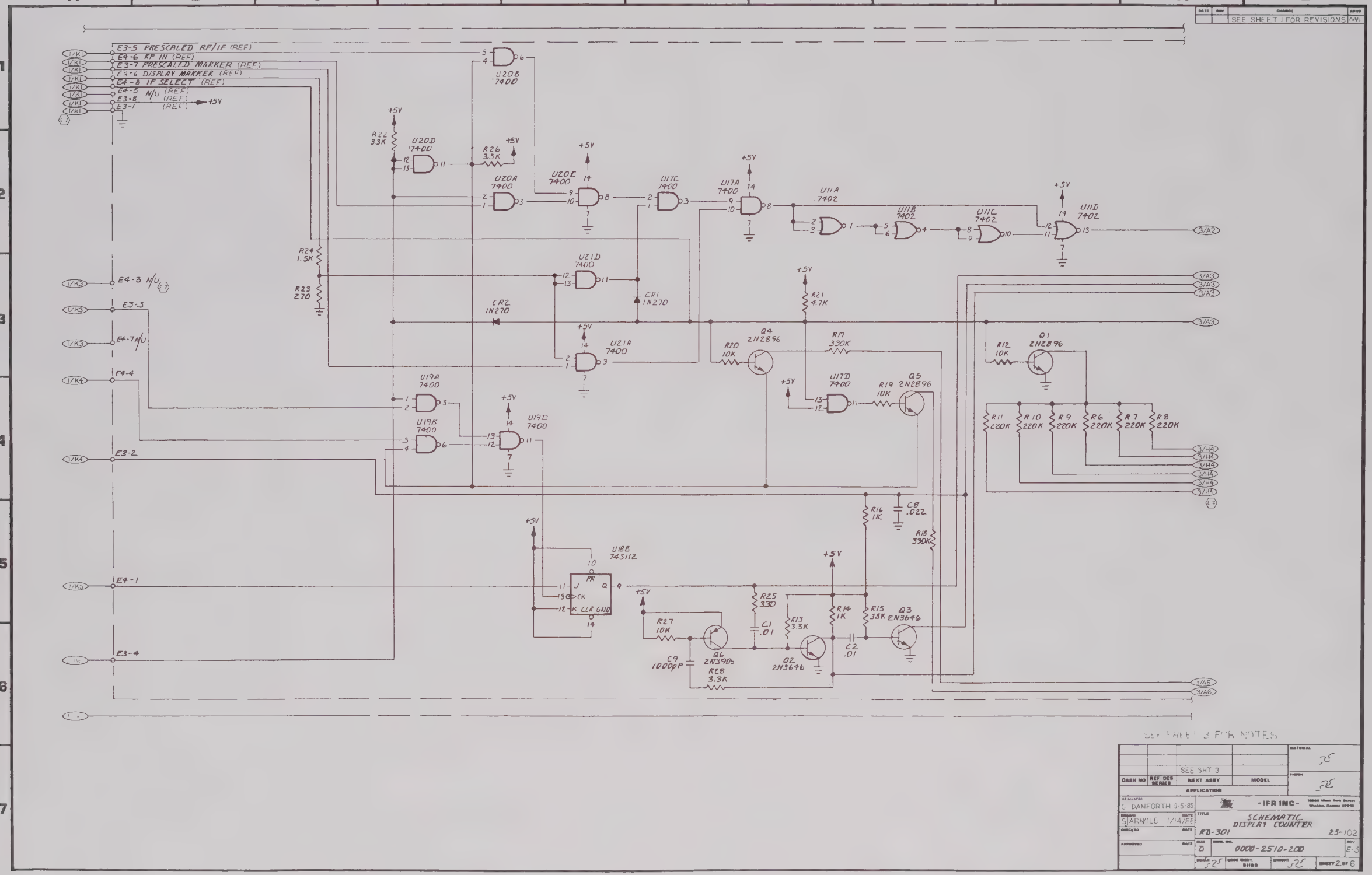

J74001
+170V
RF IN
PRESCALED RF/IF IN
PRESCALED MARKER
DISPLAY MARKER
IF SELECT
+12V
+5V
GND
SWEEP OUT
10KHz IN
KEY
N/C
PRF/RF
E3-5 PRESCALED RF/IF
E4-6 RF
E3-7 PRESCALED MARKER
E3-6 DISPLAY MARKER
E4-8 IF SELECT
E4-5 +12V N/U
E3-8 +5V
E3-1 GND
R7 10K SWEEP ADJ
Q1 2N3646
Q2 2N3646
Q3 2N2222
Q4 2N2222
Q5 2N2907A
Q6 2N2907A
U1 7490
U2 7490
U3 7490
U4 7490
U5 7490
U6 7490
U7B 7400
U7D 7400
10 KHz
1 KHz
100 Hz
10 Hz
2 Hz
1 Hz
COUNTER GATING
PCB 1700-2505-200
PCB ASS'Y 7010-2518-000 (REF DES 31XXX)
SEE SHEET 3 FOR NOTES
SEE SHT 3
G DANFORTH 9-2-85
S ARNOLD 1/14/86
-IFR INC-
SCHEMATIC
DISPLAY COUNTER
RD-301
25-102
D
0000-2510-200
E-3
SHEET 1 OF 6

Fig. 8-26-1



SEE SHEET 1 FOR REVISIONS
E3-5 PRESCALED RF/IF (REF)
E4-6 RF IN (REF)
E3-7 PRESCALED MARKER (REF)
E3-6 DISPLAY MARKER (REF)
E4-8 IF SELECT (REF)
E4-5 N/U (REF)
E3-8 (REF)
E3-1 (REF)
E4-3 N/U
E3-3
E4-7 N/U
E4-4
E3-2
E4-1
E3-4
U20B 7400
U20D 7400
U20A 7400
U20C 7400
U17C 7400
U17A 7400
U11A 7402
U11B 7402
U11C 7402
U11D 7402
U21D 7400
U21A 7400
U19A 7400
U19B 7400
U19D 7400
U17D 7400
U18B 74S112
Q4 2N2896
Q5 2N2896
Q1 2N2896
Q6 2N3905
Q2 2N3646
Q3 2N3646
CR1 1N270
CR2 1N270
R22 3.3K
R26 3.3K
R24 1.5K
R23 270
R21 4.7K
R20 10K
R17 330K
R19 10K
R12 10K
R11 220K
R10 220K
R9 220K
R6 220K
R7 220K
R8 220K
R16 1K
C8 .022
R18 330K
R25 330
C1 .01
R13 3.3K
R14 1K
R15 3.3K
C2 .01
R27 10K
C9 1000pF
R28 3.3K
+5V
SEE SHT 3
DASH NO
REF DES SERIES
NEXT ASSY
MODEL
APPLICATION
DANFORTH 9-5-85
SJARNOLD 1/14/86
-IFR INC-
SCHEMATIC DISPLAY COUNTER
RD-301
25-102
D
0000-2510-200
E-3
SHEET 2 OF 6

Fig. 8-26-1

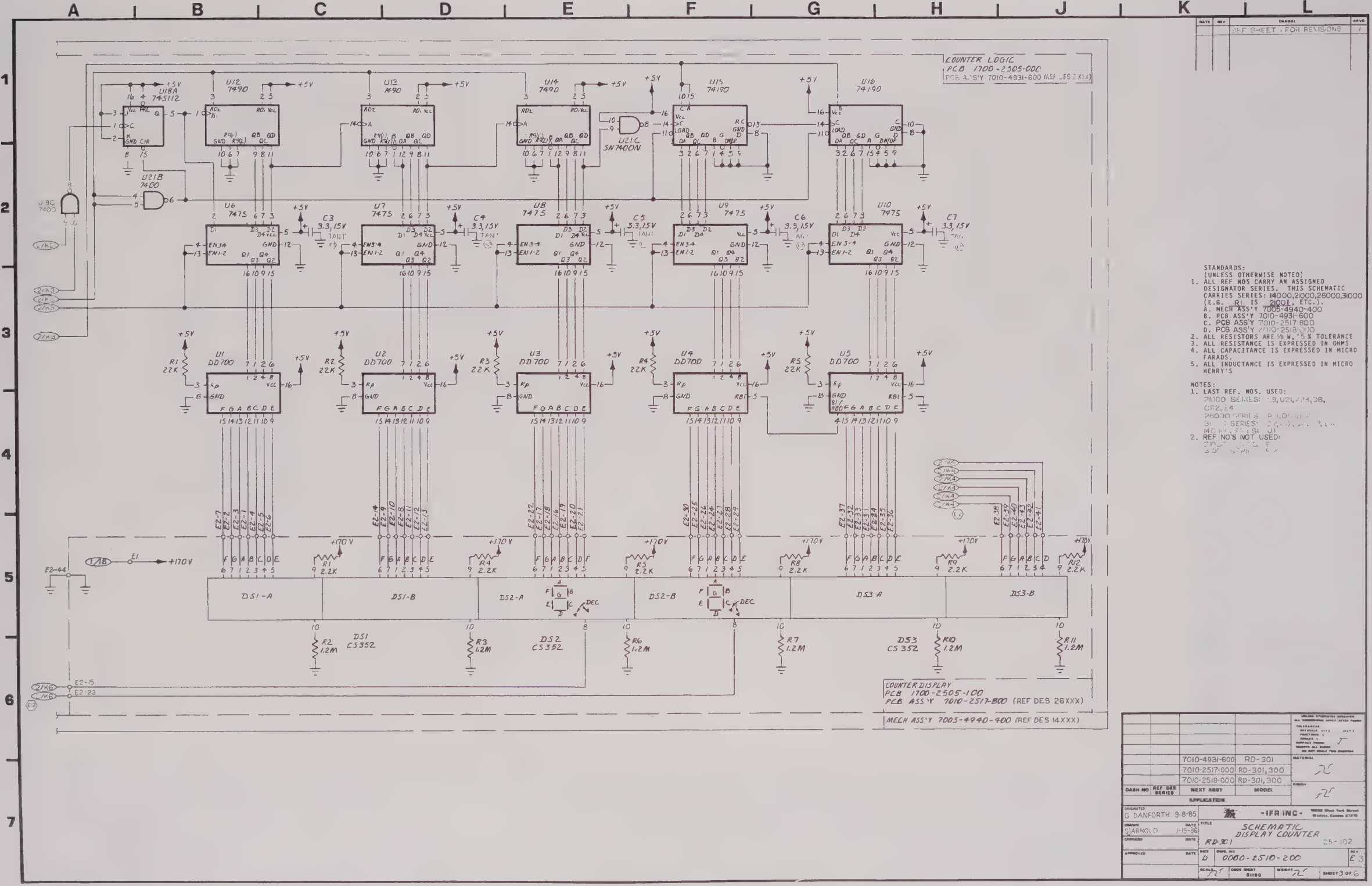

COUNTER LOGIC
PCB 1700-2505-000
PCB ASS'Y 7010-4931-600 (REF DES 2XXX)
COUNTER DISPLAY
PCB 1700-2505-100
PCB ASS'Y 7010-2517-800 (REF DES 26XXX)
MECH ASS'Y 7005-4940-400 (REF DES 14XXX)
DS1-A
DS1-B
DS2-A
DS2-B
DS3-A
DS3-B
DS1 CS352
DS2 CS352
DS3 CS352
STANDARDS:
(UNLESS OTHERWISE NOTED)
1. ALL REF NOS CARRY AN ASSIGNED DESIGNATOR SERIES. THIS SCHEMATIC CARRIES SERIES: 14000,21000,26000,31000 (E.G. R1 IS 21001, ETC.).
A. MECH ASS'Y 7005-4940-400
B. PCB ASS'Y 7010-4931-600
C. PCB ASS'Y 7010-2517-800
D. PCB ASS'Y 7010-2518-000
2. ALL RESISTORS ARE 1/8 W, ±5% TOLERANCE
3. ALL RESISTANCE IS EXPRESSED IN OHMS
4. ALL CAPACITANCE IS EXPRESSED IN MICRO FARADS.
5. ALL INDUCTANCE IS EXPRESSED IN MICRO HENRY'S
NOTES:
1. LAST REF. NOS. USED:
2. REF NO'S NOT USED:
7010-4931-600 RD-301
7010-2517-000 RD-301,300
7010-2518-000 RD-301,300
DASH NO
REF DES SERIES
NEXT ASSY
MODEL
APPLICATION
G DANFORTH 9-8-85
-IFR INC-
SCHEMATIC DISPLAY COUNTER
RD-301
25-102
D
0000-2510-200
E 3
SHEET 3 OF 6

Fig. 8-26-1

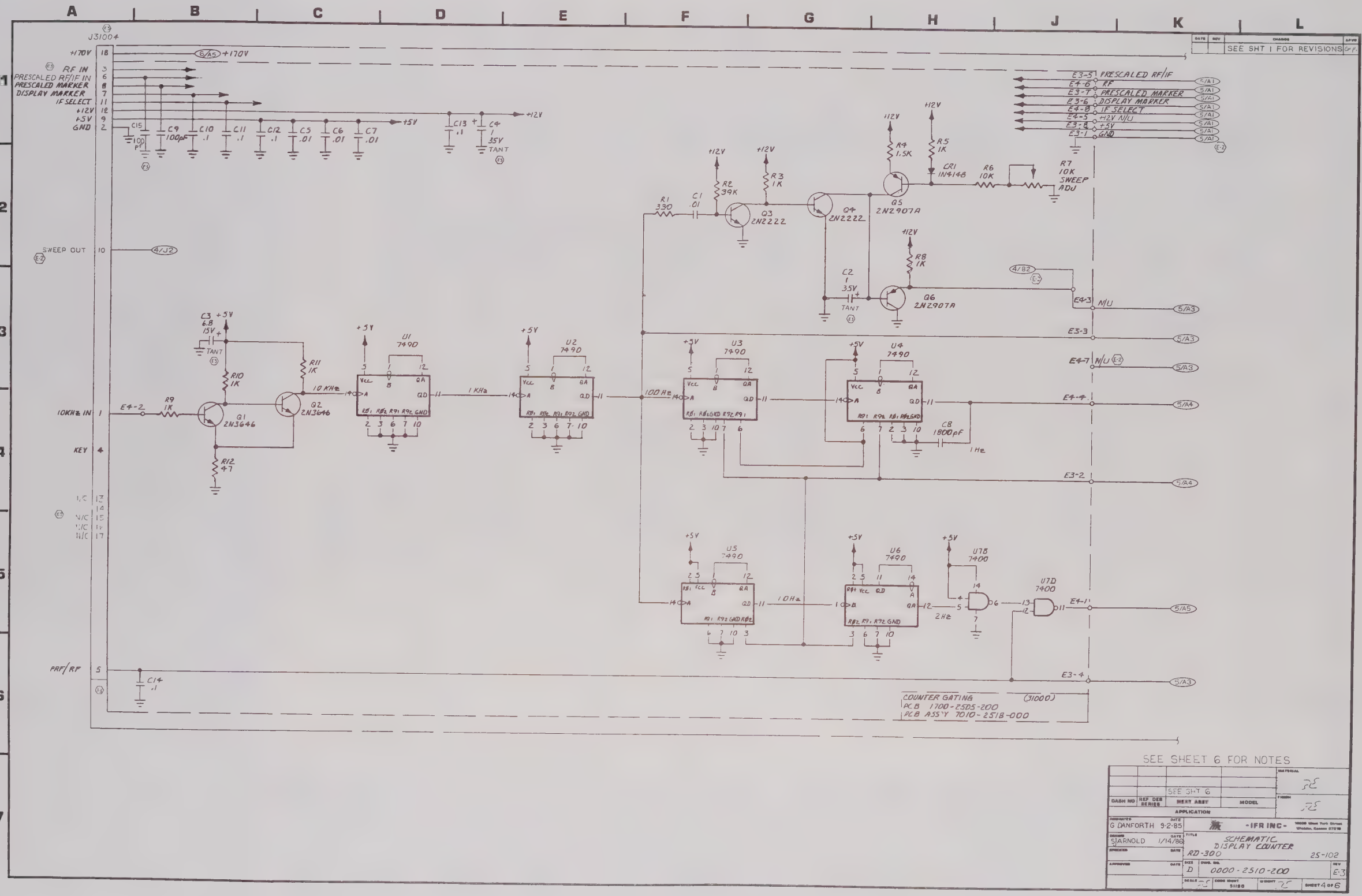

J31004
+17DV
RF IN
PRESCALED RF/IF IN
PRESCALED MARKER
DISPLAY MARKER
IF SELECT
+12V
+5V
GND
SWEEP OUT
10KHz IN
KEY
PRF/RF
C15 100 pF
C9 100pF
C10 .1
C11 .1
C12 .1
C5 .01
C6 .01
C7 .01
C13 .1
C4 1 35V TANT
C3 6.8 15V TANT
R10 1K
R11 1K
R9 1K
R12 47
Q1 2N3646
Q2 2N3646
10 KHz
U1 7490
U2 7490
1 KHz
100 Hz
U3 7490
U4 7490
C8 1800pF
1 Hz
U5 7490
U6 7490
U7A 7400
U7D 7400
10Hz
2Hz
C14 .1
R1 330
C1 .01
R2 39K
R3 1K
Q3 2N2222
Q4 2N2222
R4 1.5K
R5 1K
CR1 IN4148
R6 10K
R7 10K SWEEP ADJ
Q5 2N2907A
R8 1K
C2 1 35V TANT
Q6 2N2907A
E3-5 PRESCALED RF/IF
E4-6 RF
E3-7 PRESCALED MARKER
E3-6 DISPLAY MARKER
E4-8 IF SELECT
E4-5 +12V N/U
E3-8 +5V
E3-1 GND
E4-3 N/U
E3-3
E4-7 N/U
E4-4
E3-2
E4-1
E3-4
COUNTER GATING (31000)
PCB 1700-2505-200
PCB ASSY 7010-2518-000
SEE SHEET 6 FOR NOTES
SEE SHT 6
SCHEMATIC
DISPLAY COUNTER
RD-300
25-102
G DANFORTH 9-2-85
S JARNOLD 1/14/88
0000-2510-200
SHEET 4 OF 6

Fig. 8-26-1

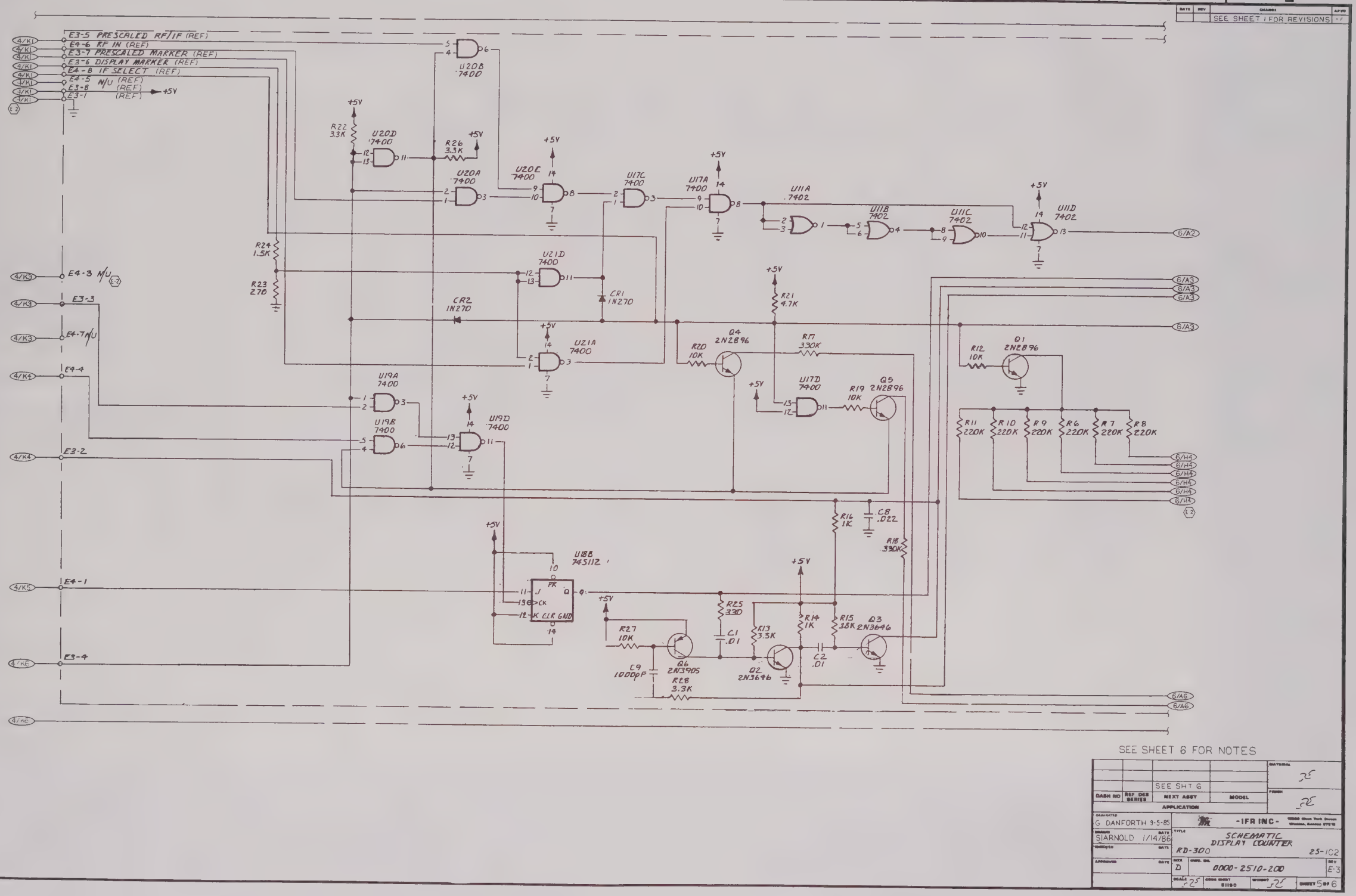

E3-5 PRESCALED RF/IF (REF)
E4-6 RF IN (REF)
E3-7 PRESCALED MARKER (REF)
E3-6 DISPLAY MARKER (REF)
E4-8 IF SELECT (REF)
E4-5 N/U (REF)
E3-8 (REF)
E3-1 (REF)
+5V
E4-3 N/U
E3-3
E4-7 N/U
E4-4
E3-2
E4-1
E3-4
U20B 7400
U20D 7400
U20C 7400
U20A 7400
U17C 7400
U17A 7400
U11A 7402
U11B 7402
U11C 7402
U11D 7402
U21D 7400
U21A 7400
U19A 7400
U19B 7400
U19D 7400
U17D 7400
U18B 74S112
R22 3.3K
R26 3.3K
R24 1.5K
R23 270
CR2 1N270
CR1 1N270
R21 4.7K
Q4 2N2896
R20 10K
R17 330K
Q1 2N2896
R12 10K
R19 10K
Q5 2N2896
R11 220K
R10 220K
R9 220K
R6 220K
R7 220K
R8 220K
R16 1K
C8 .022
R18 330K
R27 10K
C9 1000pF
Q6 2N3905
R28 3.3K
R25 330
C1 .01
R13 3.5K
Q2 2N3646
R14 1K
C2 .01
R15 38K
Q3 2N3646
G/A2
G/A3
G/A6
G/H4
SEE SHEET 6 FOR NOTES
SEE SHT 6
NEXT ASSY
MODEL
APPLICATION
G DANFORTH 9-5-85
S JARNOLD 1/14/86
-IFR INC-
SCHEMATIC
DISPLAY COUNTER
RD-300
25-102
0000-2510-200
SHEET 5 of 6

Fig. 8-26-1

COUNTER LOGIC
PCB 1700-2505-000
PCB ASS'Y 7010-2517-900

DATE	REV		APVD
		SEE SHEET 1 FOR REVISIONS	

STANDARDS:
(UNLESS OTHERWISE NOTED)
1. ALL REF NOS CARRY AN ASSIGNED DESIGNATOR SERIES. THIS SCHEMATIC CARRIES SERIES: 26000 FOR 7010-2517-800, 31000 FOR 7010-2518-000 (E.G. R1 IS 31001 ETC.)
   A. MECH ASS'Y 7040-2517-700
   B. PCB ASS'Y 7010-2517-900
   C. PCB ASS'Y 7010-2517-800
   D. PCB ASS'Y 7010-2518-000
2. ALL RESISTORS ARE ¼ W. ±5 % TOLERANCE
3. ALL RESISTANCE IS EXPRESSED IN OHMS
4. ALL CAPACITANCE IS EXPRESSED IN MICRO FARADS
5. ALL INDUCTANCE IS EXPRESSED IN MICRO HENRY'S

NOTES:
1. LAST REF. NOS. USED:
   21000 SERIES: C9, U21, R28, Q8, CR2, E4
   26000 SERIES: R11, DS1, E2
   31000 SERIES: C7, R12, Q6, U7, E4
   14000 SERIES: J1
2. REF NO'S NOT USED:
   21000 SERIES: E1
   31000 SERIES: E2

DASH NO	REF DES SERIES	NEXT ASSY	MODEL
APPLICATION			
		7010-2517-900	RD 300
		7010-2517-800	RD 300, 301
		7010 2518-000	RD 300, 301

DESIGNATED: S DANFORTH 9-8-85
DRAWN: SJARNOLD 1-15-86
CHECKED
APPROVED

- IFR INC -

TITLE: SCHEMATIC, DISPLAY COUNTER
RD-300 25-102
SIZE: D | DRWG. NO: 0000-2510-200 | REV: E-3
SCALE: NONE | CODE IDENT: 81180 | WEIGHT: NONE | SHEET 6 OF 6

Fig. 8-26-1

3/23/79	A	INC. ECN 2139 LyC	BJP MD
2-21-79	B	INC. ECN 2787 JAJ	BJP WW
10-24-79	C	INC. ECN 3410 RLD	RL
4-15-80	D	INC. ECN 3452 RLD	RL

— SEE SHT 1 OF 2 —

TO +5V TB1-1 — J4-9 — C3-7 3.3uf 15V tant. — TO DISPLAY BOARD DECIMAL No 2 — GND — J4-2 — TO DISPLAY BOARD DECIMAL No 3 — TO J7-7 IF SELECT — TO J4-11

1-25-0050 P.C. BOARD
1-25-0179 P/L

R17 330K — R18 330K — Q4 2N2896 — Q5 2N2896 — R20 10K — R19 10K — U17a 1/4 7400 — R21 47K — R12 10K — Q1 2N2896

R9, R6, R7, R8, R10, R11 — A, B, C, D, F, G — 1/2 OF DISPLAY PACK NO. 3 — 220K TO DIGIT No. 6 SEE PINOUT INFO. BELOW

TO J2-17 PRF IN — J4-3 — RF — PRF — TO J44 PRESCALED RF/IF IN — J4-5 — J4-6 — TO J45 PRESCALED MARKER — J4-8 — DISPLAY MKR — S4 — TO J3-3 DISPLAY MARKER — J4-7

R22 3.3K — R23 270 — R24 1.5K — CR1 1N270 — CR2 1N270 — U20 — U17a — U17c — U21a — U21b — U11a,b,c,d — U18a — U19c — U21c — U18b — U19a,b,d — U21d

R16 1K — R13 3.3K — R14 1K — R15 3.3K — C8 .022 — C1 .01 — C2 .01 — R25 330 — Q2 2N3646 — Q' 2N3646

U12 7490 — U13 7490 — U14 7490 — U15 74190 — U16 74190 — U6 7475 — U7 7475 — U8 7475 — U9 7475 — U10 7475

R1 22K — R2 22K — R3 22K — R4 22K — R5 22K — U1 — U2 — U3 — U4 — U5

U1 THRU U5 ARE DD700'S

DIGIT NO 1 PINS — DIGIT NO. 2 PINS — DIGIT NO. 3 PINS — DIGIT NO 4 PINS — DIGIT NO. 5 PINS

DISPLAY PACK NO. 1 — DISPLAY PACK NO. 2 — 1/2 DISPLAY PACK NO. 3

SIDE "B" DIGIT 2, 4 & 6 — SIDE "A" DIGIT 1,3 & 5

NUMERICS BY SEGMENT

Sect. A — Sect. B — SEG. "A" — SEG. "B" — SEG "G" — SEG. "F" — SEG. "E" — SEG. "C" — SEG. "D" — DEC — ANODE — KEEP ALIVE — ANODE

DISPLAY REAR VIEW

TYP. SEG. — TYP. PIN NO.
A.....1
B.....2
C.....3
D.....4
E.....5
F.....6
G.....7
DEC....8
ANODE..9
KA.....10

+180V MAX TO DISPLAY BD. — 2.2K R4,R8, R12 — 2.2K R1, R5, R9 — R3, R7, R11 1.2M — R2, R6, R10 1.2M — Sect. B — Sect. A — TYP DISPLAY PINOUT FOR ONE PACK

TO +12V TB 1-2 J4-12 — C5 .01uf — C6 .01uf — C7 .01uf — C4 1uf 35V — R2 39K — R1 330 — C1 .01 — Q3 2N2222 — Q4 2N2222 — R4 1.5K — R5 1K — Q5 2N3251 — CR1 1N4148 — R7 10K — R6 10K SWEEP ADJ — C2 1uf 35V tant — R3 1K — R8 1K — Q6 2N3251

TO J1-12 10 KHz IN — J4-1 — C3 6.8uf 15V tant. — R10 1K — R11 1K — R9 1K — Q1 2N3646 — Q2 2N3646 — R12 47 — U1 7490 — U2 7490 — U3 7490 — U4 7490 — 10KHz — 1 KHz — 100 Hz — 10Hz — 1Hz — C8 chip.0018 — U5 7490 — U6 7490 — 2Hz — U7d — U7b

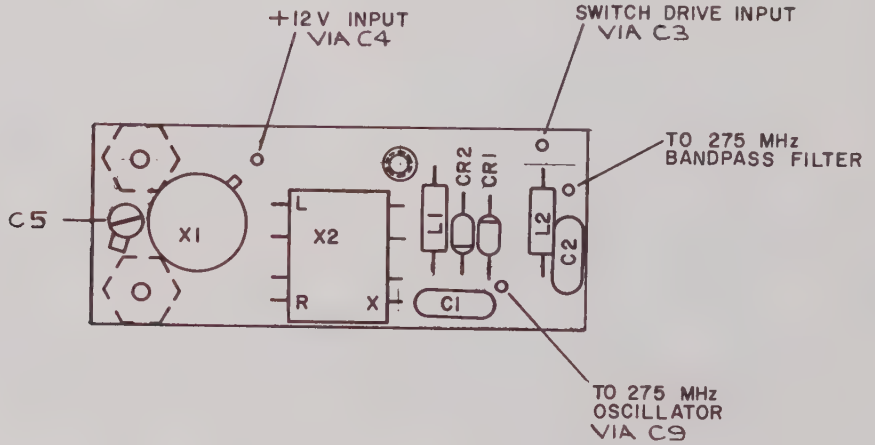
J4-18 — +170V — +170V

J4-10 — TO S7 SWEEP OUT

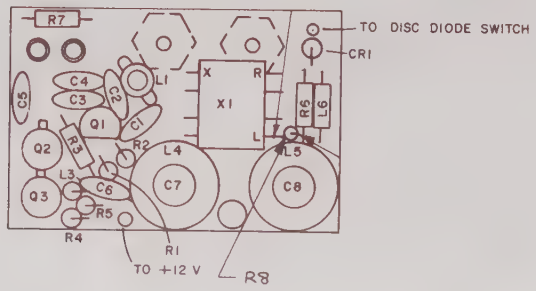
1-25-0052 P.C. BOARD | 1-25-0180 P/L

DRAWN L A Meis, Jr	09Nov84	ifr	COUNTER SCHEMATIC RD-300
CHECKED			25-102
APPROVED			
RELEASED TE	21/1/85		DC00-2510-200
MODEL		NONE	2 2 DIV E-1

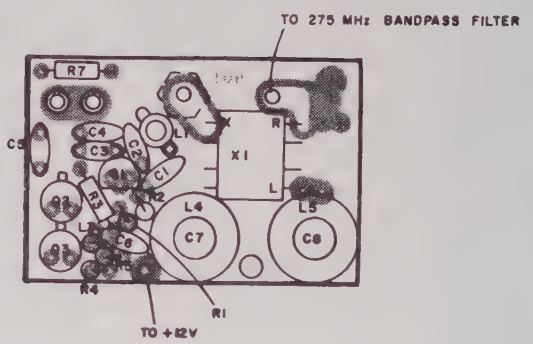
Fig. 8-26



DISCRIMINATOR DIODE SWITCH BOARD
(7010-2518-700-E)

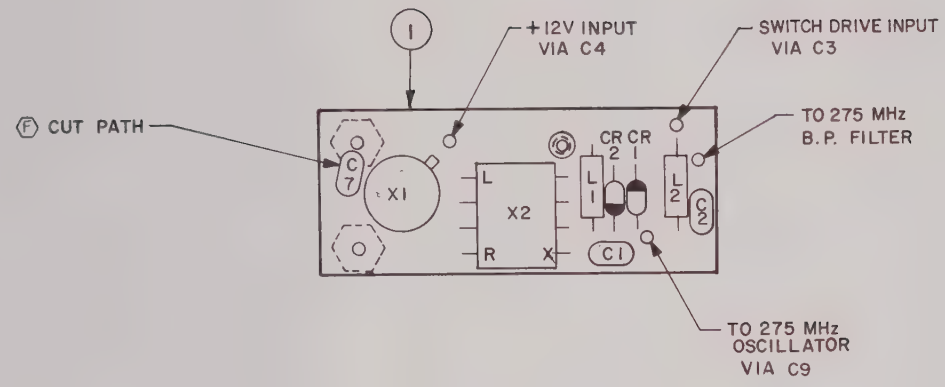


275 MHz OSCILLATOR BOARD
(7010-2518-500-J)

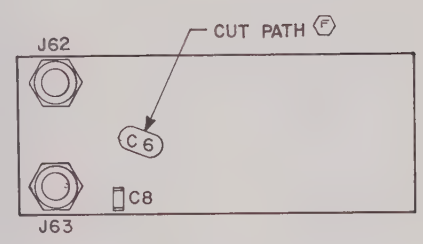


305 MHz OSCILLATOR BOARD

Fig. 8-27 SINGLE SIDEBAND MODULE PARTS LAYOUT

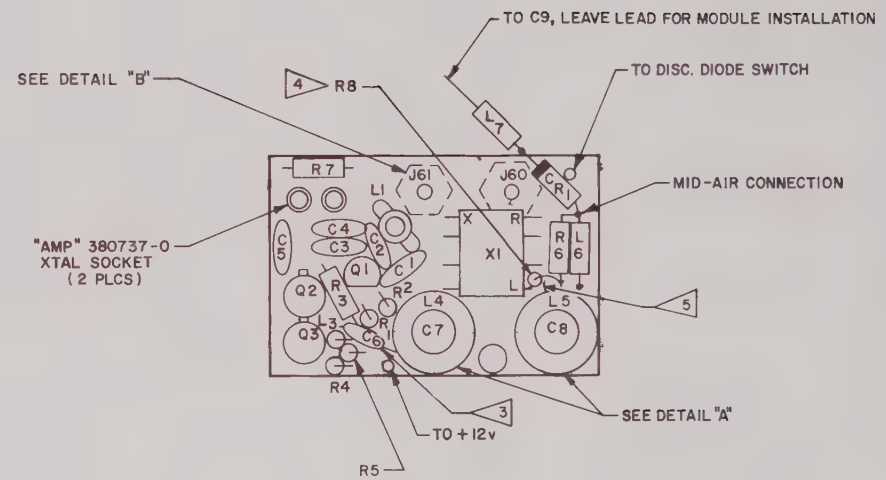


TOP VIEW



BOTTOM VIEW

DISCRIMINATOR DIODE SWITCH BOARD
(7010-2518-700-G)



275 MHz OSCILLATOR BOARD
(7010-2518-500-K)

Fig. 8-27-1 SINGLE SIDEBAND MODULE PARTS LAYOUT

SINGLE SIDEBAND MODULE THEORY OF OPERATION

(RD-300)

3-25-120

1-1. Introduction.

1-2. In the Track mode of operation, the mixed down XMTR SAMPLE from the X-Band Front End is mixed with the output of the VCO in the single Sideband Module. The SSB Module processes the Cal Output pulse from the 30 MHz Pulse Discriminator to provide the sample pulse for the 30 MHz output to the 30 MHz Pulse Discriminator.

2-1. XMTR SAMPLE Processing.

2-2. The 1125 MHz L-Band VCO Sample #2 is inputted into the SSB Module on J60. This signal is mixed with 275 MHz by X1 (MD113) to produce 850 MHz which is inputted to an external 770 to 900 MHz Bandpass Filter.

2-3. The 275 MHz signal originates in a 91.6666 MHz crystal oscillator. This oscillator consists of Q1 (2N3905), Y1 and associated components. Variable choke L1 may be adjusted during calibration to the exact frequency desired. The output of the 91.6666 MHz oscillator is coupled to amplifiers Q2 & Q3 (66382) via C5. The output of Q2 & Q3 is applied to a tuned circuit consisting of C7 and L4. This tuned circuit is coupled to another tuned circuit consisting of C8 and L5. Both tuned circuits are tuned to the 3rd harmonic of the 91.6666 MHz oscillator (275 MHz).

2-4. The XMTR SAMPLE from the X-Band Front End is amplified by X1 (GPD402). The output of X1 is applied to input port L of mixer MX1 (MD113). A variable capacitor is used on X1 pin 2 to adjust the VSWR of the amplifier input for the frequency from the Front End.

2-5. The translated VCO sample frequency from the output of the external 770 to 900 MHz Bandpass Filter is mixed with the 1125 MHz XMTR SAMPLE pulses by mixer MX1. The output of MX1 is the XMTR SAMPLE frequency minus the VCO frequency. For example: 1125 MHz-850 MHz or 275 MHz.

2-6. When the CAL TEST DRIVE signal on J12 pin 1 is high (about +1V), CR1 (MA47047) is reversed biased and CR2 (MA47047) is forward biased. This allows the 275 MHz output of MX1 to pass through CR2 and C2 to the 275 MHz Bandpass Filter.

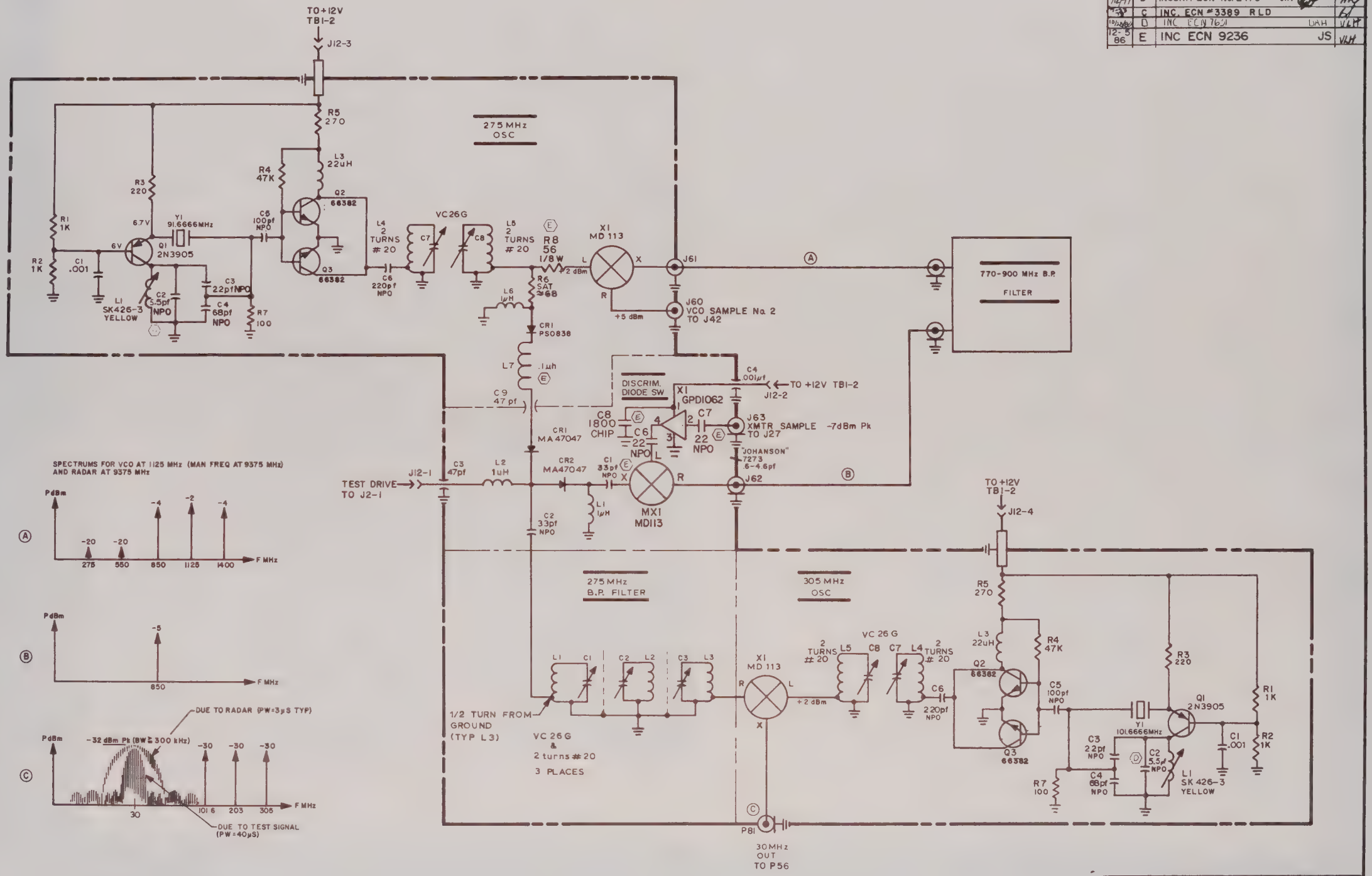
2-7. The 275 MHz Bandpass Filter consists of L1, L2, L3, C1, C2 and C3. The 275 MHz output of the 275 MHz filter is applied to input port R of mixer X1 (MD113) of the 305 MHz Oscillator.

2-8. Operation of the 305 MHz Oscillator is identical to the 275 MHz Oscillator. The 275 MHz output of the 275 MHz Banpass Filter is mixed with the 305 MHz output of the 305 MHz Oscillator by mixer X1. If the VCO frequency at J60 equals frequency of the translated XMTR SAMPLE pulses at J63, the mixed-down Information pulse output at P81 will be exactly 30 MHz at a level of about -30 dBm. Any frequency deviation from 30 MHz at P81 represents a frequency discrepancy between the VCO sample and the XMTR SAMPLE from the X-Band Front End.

3-1. CAL TEST DRIVE Processing.

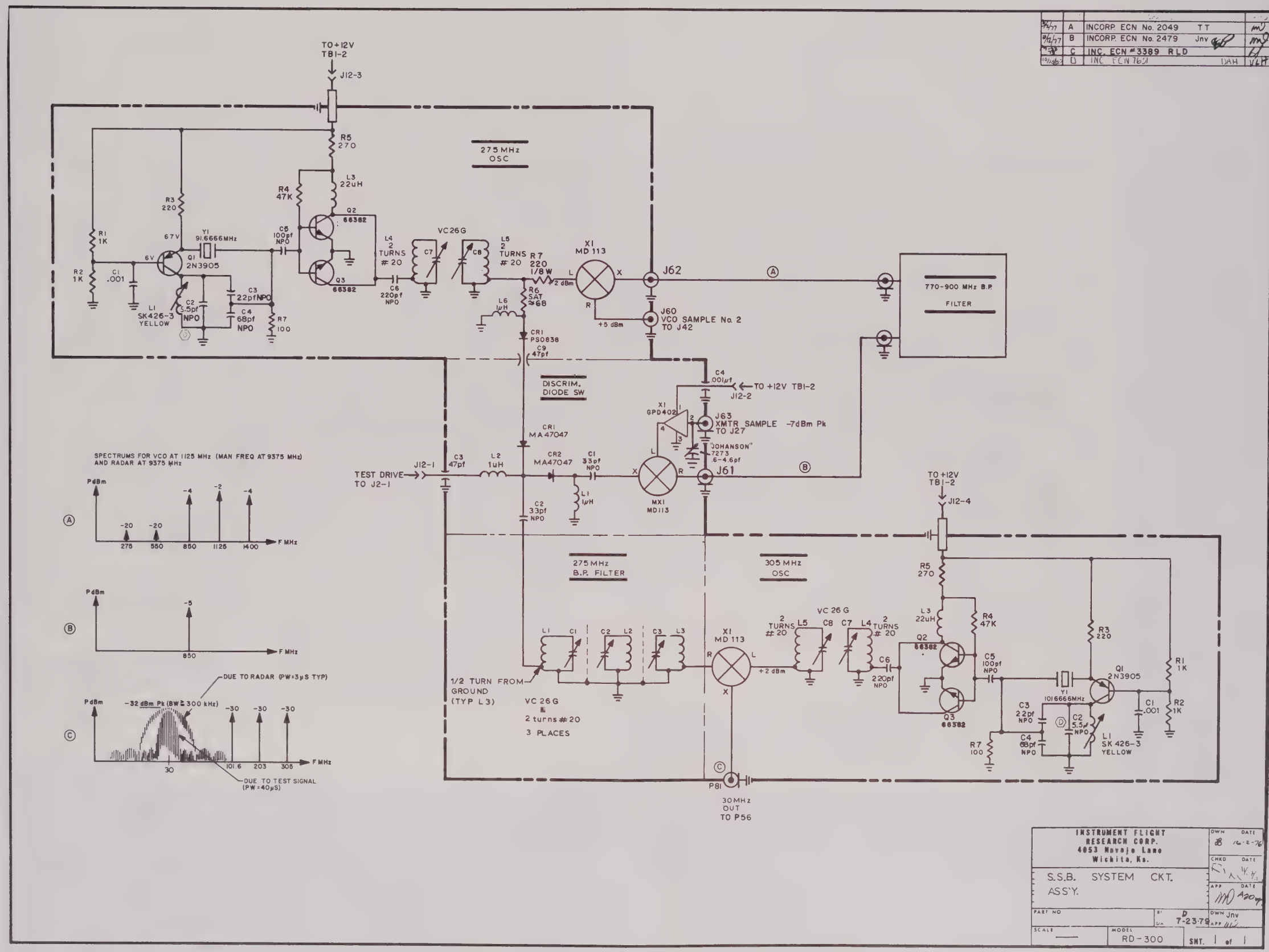
3-2. PIN diode switches CR1 & CR2 in the Discriminator Diode Switch connect either the output of MX1 or a sample of the 275 MHz Oscillator to the 275 MHz Bandpass Filter. Circuitry in the 30 MHz Discriminator Module provides a +1V signal which forward biases CR2 and reverse biases CR1 during a XMTR SAMPLE pulse. 40µs after the XMTR SAMPLE pulse, the CAL TEST DRIVE signal drops to -1V. This signal remains low for 40µs. During this time, CR1 is biased to turn ON and CR2 is biased OFF. With CR1 ON, the output of the 275 MHz Oscillator is applied to the 275 MHz Bandpass Filter. The output of the 305 MHz oscillator produces the 40µs, 30 MHz Calibration pulse used in the 30 MHz Pulse Discriminator 40µs after the Information pulse.

3/4/77	A	INCORP. ECN No. 2049 T.T	mj
8/12/77	B	INCORP. ECN No. 2479 Jnv	mj
	C	INC. ECN #3389 RLD	
10/3/86	D	INC ECN 7651 DAH	VLH
12-5 86	E	INC ECN 9236 JS	VLH



INSTRUMENT FLIGHT RESEARCH CORP. 4053 Navajo Lane Wichita, Ks.	DWN	DATE 16-2-76
	CHKD	DATE
S.S.B. SYSTEM CKT. ASS'Y.	APP	DATE
PART NO 0000-2512-000 REV E DATE 7-23-79	DWN Jnv APP	
SCALE — MODEL RD-300	SHT. 1 of 1	

Fig. 8-28-1



A INCORP. ECN No. 2049 TT
B INCORP. ECN No. 2479 Jnv
C INC. ECN #3389 RLD
D INC ECN 7651 DAH
TO +12V TB1-2
J12-3
R5 270
L3 22uH
R4 47K
Q2 66382
Q3 66382
275 MHz OSC
R3 220
R1 1K
R2 1K
C1 .001
Q1 2N3905
Y1 91.6666MHz
C5 100pf NPO
C2 5.5pf NPO
C3 22pf NPO
C4 68pf NPO
R7 100
L1 SK426-3 YELLOW
L4 2 TURNS #20
C6 220pf NPO
VC26G
C7
C8
L5 2 TURNS #20
R7 220 1/8W
R6 SAT ≈68
L6 1μH
CR1 PS0838
C9 47pf
X1 MD 113
J62
J60 VCO SAMPLE No. 2 TO J42
770-900 MHz B.P. FILTER
DISCRIM. DIODE SW
C4 .001μf
TO +12V TB1-2
J12-2
X1 GPD402
J63 XMTR SAMPLE -7dBm Pk TO J27
"JOHANSON" 7273 .6-4.6pf
J61
CR1 MA47047
CR2 MA47047
C1 33pf NPO
L1 1μH
MX1 MD113
TEST DRIVE TO J2-1
J12-1
C3 47pf
L2 1uH
C2 33pf NPO
SPECTRUMS FOR VCO AT 1125 MHz (MAN FREQ AT 9375 MHz) AND RADAR AT 9375 MHz
PdBm
-20 -20 -4 -2 -4
275 550 850 1125 1400 F MHz
-5
850
DUE TO RADAR (PW=3μS TYP)
-32 dBm Pk (BW≥300 kHz)
-30 -30 -30
30 101.6 203 305 F MHz
DUE TO TEST SIGNAL (PW=40μS)
TO +12V TB1-2
J12-4
275 MHz B.P. FILTER
305 MHz OSC
R5 270
L3 22uH
R4 47K
Q2 66382
Q3 66382
C5 100pf NPO
R3 220
Q1 2N3905
Y1 1016666MHz
C3 22pf NPO
C2 5.5pf NPO
C4 68pf NPO
R7 100
L1 SK 426-3 YELLOW
C1 .001
R1 1K
R2 1K
1/2 TURN FROM GROUND (TYP L3)
VC 26G
2 turns #20
3 PLACES
X1 MD 113
2 TURNS #20
VC 26 G
C6 220pf NPO
+2 dBm
P81
30MHz OUT TO P56
INSTRUMENT FLIGHT RESEARCH CORP.
4053 Navajo Lane
Wichita, Ks.
S.S.B. SYSTEM CKT. ASS'Y.
D 7-23-79
RD-300
SHT. 1 of 1

Fig. 8-28

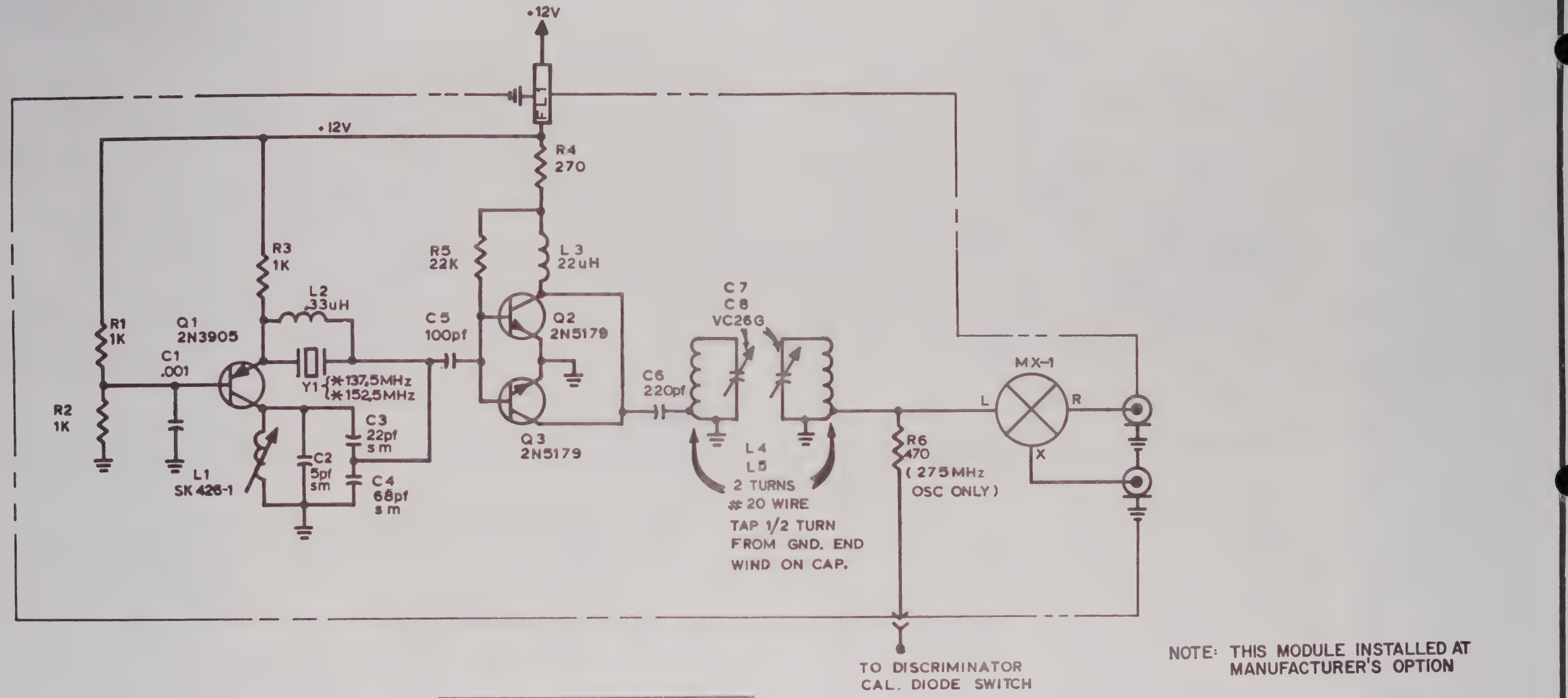

+12V
FL1
+12V
R4
270
R3
1K
R5
22K
L3
22uH
L2
.33uH
C5
100pf
Q2
2N5179
C7
C8
VC26G
R1
1K
Q1
2N3905
C1
.001
Y1
*137.5MHz
*152.5MHz
C6
220pf
MX-1
L
R
X
R2
1K
C3
22pf
s m
C2
5pf
sm
C4
68pf
s m
Q3
2N5179
L1
SK 426-1
L4
L5
2 TURNS
20 WIRE
TAP 1/2 TURN
FROM GND. END
WIND ON CAP.
R6
470
(275MHz
OSC ONLY)
TO DISCRIMINATOR
CAL. DIODE SWITCH
NOTE: THIS MODULE INSTALLED AT
MANUFACTURER'S OPTION
* 137.5MHz FOR 275MHz OPERATION
* 152.5MHz FOR 305MHz OPERATION
INSTRUMENT FLIGHT
RESEARCH CORP.
4053 Navajo Lane
Wichita, Ks.
305 & 275 MHz OSC.
(SCHEMATIC)
PART NO
2-25-0110
REV
DATE
SCALE
MODEL
RD-300
SHT. 1 of 2
DWN
DATE
10-2-75
CHKD
DATE
APP
DATE
DWN
APP

Fig. 8-29

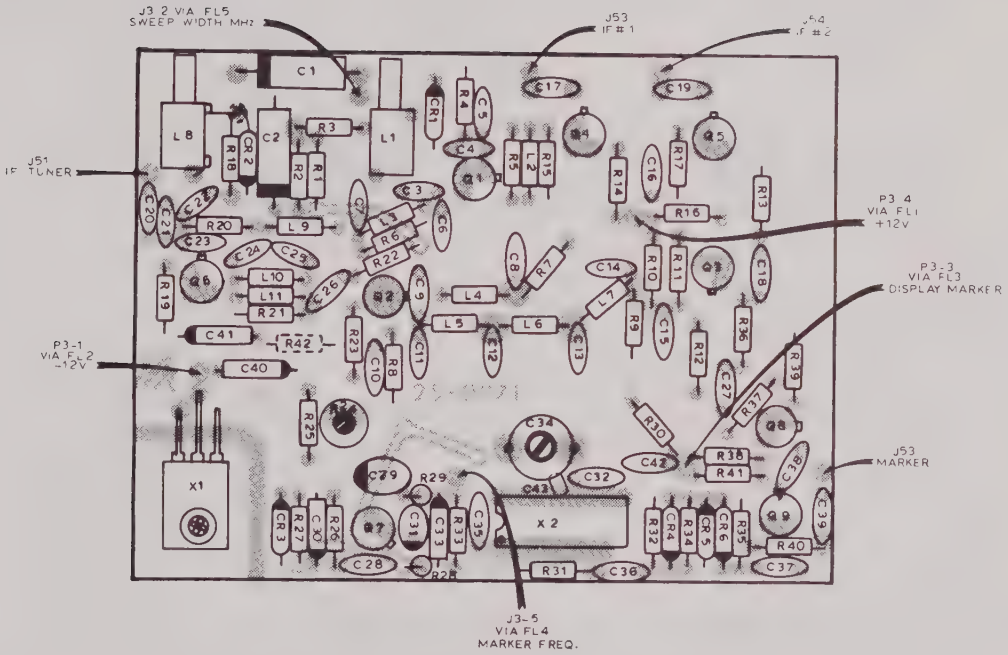
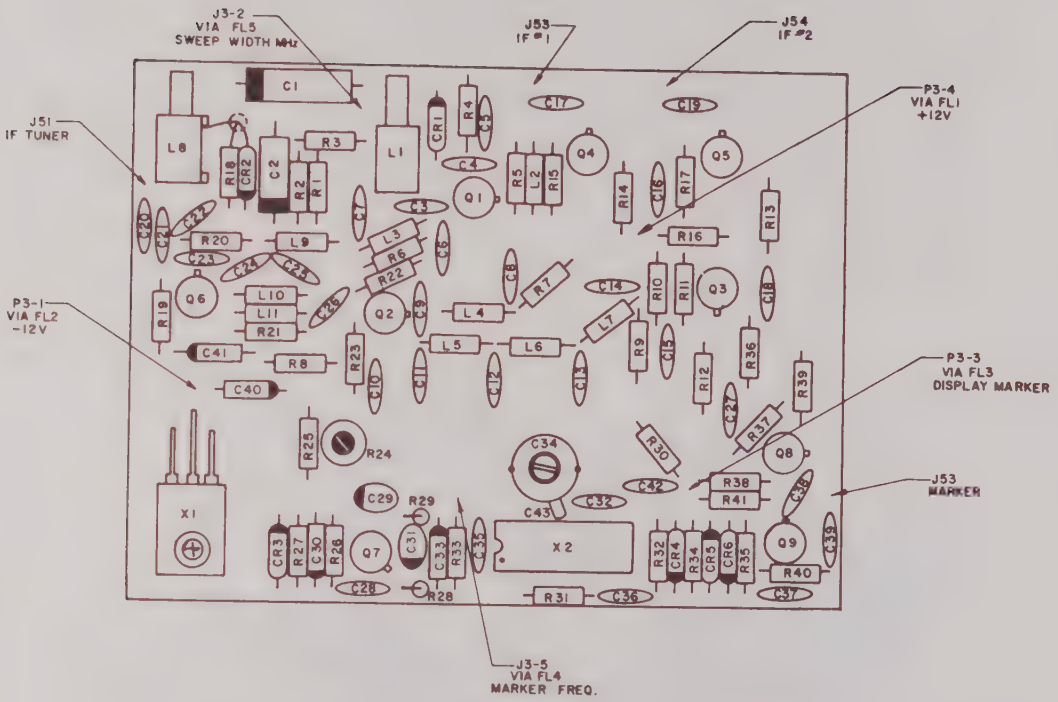


Fig. 8-30 IF & MARKER OSCILLATOR BOARD PARTS LAYOUT



NOTES

1. ALL RESISTORS ARE 1/4W, 10% TOL. EXCEPT AS NOTED.
2. ALL CAPACITORS ARE IN μf EXCEPT AS NOTED.
3. COMPONENT LEADS MAY EXTEND .04 TO .06 BEYOND BOTTOM OF BOARD AFTER SOLDERING.
4. MAXIMUM HEIGHT OF COMPONENTS TO BE .60 FROM COMPONENT SIDE OF BOARD.
5. SCHEMATIC DWG. # 0000-2510-500
6. P.C. BOARD P/N # 1700-2510-500

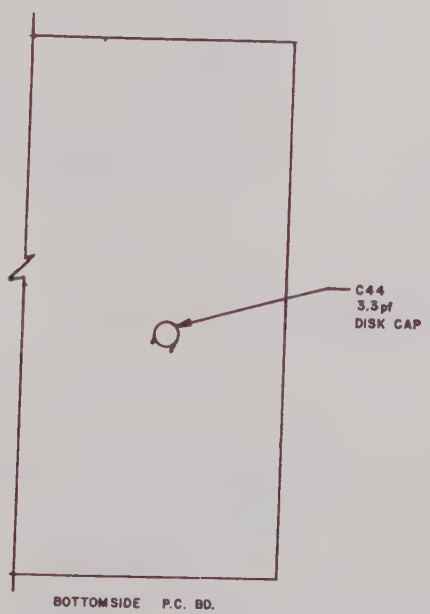


Fig. 8-30-1 IF & MARKER OSCILLATOR BOARD PARTS LAYOUT (7010-2517-500-Y)

IF & MARKER OSCILLATOR THEORY OF OPERATION

(RD-300)

3-25-105

1-1. Introduction.

1-2. The IF and MARKER Oscillator of the RD-300 produces an IF output from 20 to 70 MHz. The IF Oscillator is manually tuned and may be swept to 4 MHz. When the DISPLAY MARKER SWITCH on the Front Panel is depressed, the IF and MARKER Oscillator provides the IF signal with a MARKER signal injected -24 dBc (decibles referenced to carrier level).

2-1. IF Signal Generation.

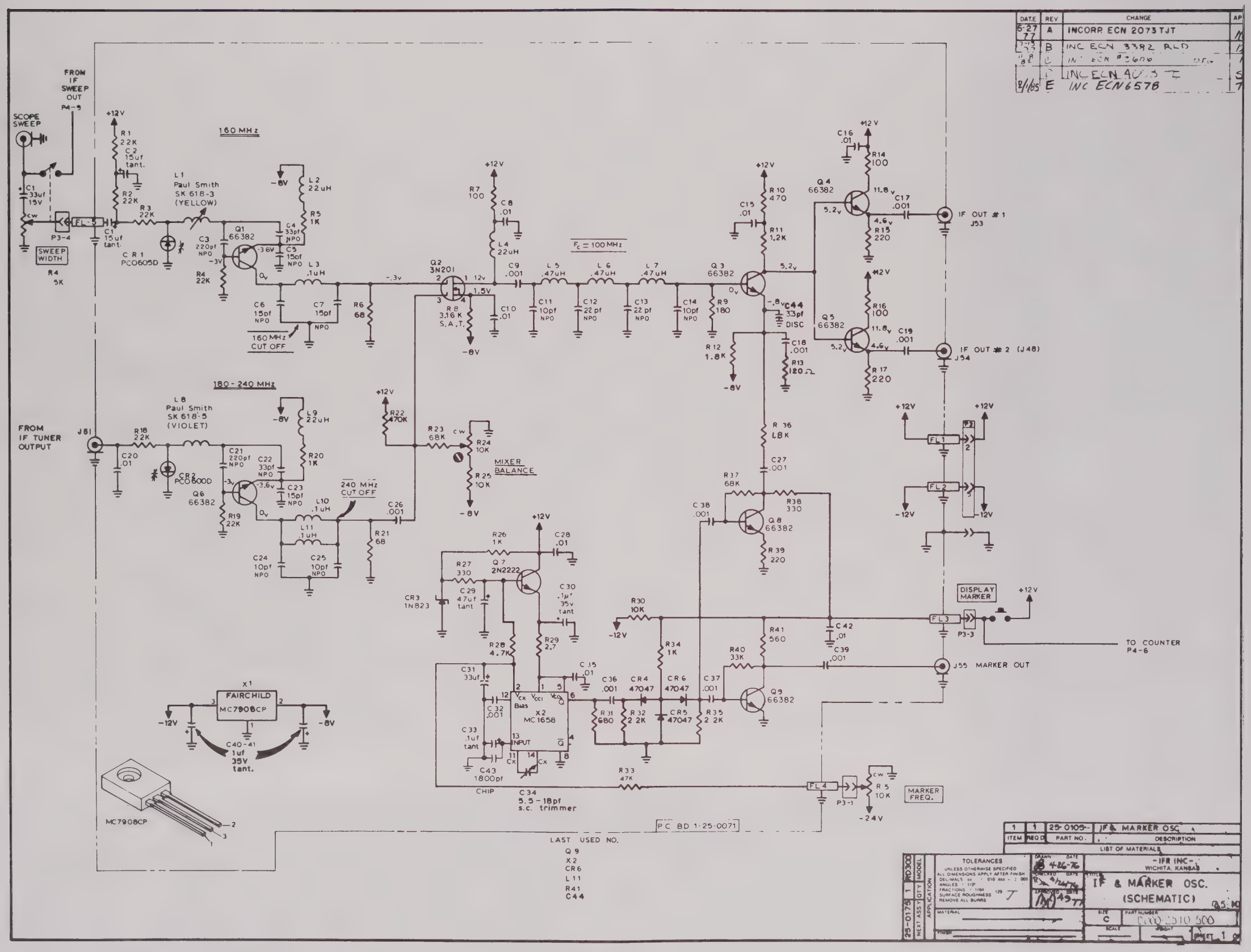
2-2 The 20 to 70 MHz IF is formed by mixing the output of a fixed 160 MHz oscillator with the output of a 180 to 240 MHz variable oscillator. The 160 MHz oscillator consists of Q1 (66382), CR1 (PC0605D) and associated circuitry. The frequency of the 160 MHz oscillator is determined by the capacitance of varactor diode CR1 and the inductance of variable inductor L1. During calibration, the output of the oscillator may be adjusted to the frequency desired by L1. When the Front Panel SWEEP WIDTH CONTROL is not in the detent, OFF position; the 160 MHz oscillator is swept by a 100 Hz ramp which originates in the Digital Display Assembly and is inputted on P3 pin 4. Range of the swept 160 MHz oscillator output frequencies may be adjusted between 0 and 4 MHz by use of the Front Panel SWEEP WIDTH CONTROL. The output of the 160 MHz oscillator is applied to pin 2 of Q2 (40673) via a 160 MHz low-pass filter consisting of L3, C6 and C7.

2-3. Operation of the 180-240 MHz variable oscillator is simular to the above. The frequency of the output is dependent on the voltage present on the anode of CR2 (PC0600D). This voltage determines the capacitance of CR2. During calibration, the output of the variable oscillator may be adjusted to the frequency desired by variable inductor L8. The output of the 180-240 MHz oscillator is applied to Q2 pin 3 via a 240 Mhz low-pass filter consisting of L10, L11, C24 and C25. The d.c. level of the 180-240 MHz oscillator input of Q2 may be adjusted by MIXER BALANCE pot R24 during calibration.

2-4. The output of Q2 is applied to the base of Q3 (66382) via a 100 MHz low-pass filter consisting of L5, L6, L7, C11, C12, C13 and C14. When the DISPLAY MARKER SWITCH on the Front Panel is depressed, the output of the MARKER oscillator is applied to the emitter of Q3. The output of Q3 is buffered by Q4 (66382) and Q5 (66382). The outputs of Q4 & Q5 are used as the IF OUT #1 and the IF OUT #2 signals.

3-1. MARKER Oscillator Operation.

3-2. The MARKER oscillator consists of X2 (MC1658) and associated components. X2 is an ECL voltage controlled multivibrator. Q7 (2N2222), zener diode CR3 (1N823) and associated components are used to provide the proper supply voltages to the MARKER oscillator. CR4 - CR6 (47047) are associated components comprise a diode switch. When the DISPLAY MARKER SWITCH on the Front Panel is pressed. CR4 & CR6 are forward biased. This forwarding biasing of CR4 & CR6 allows the output of the MARKER oscillator to be applied to buffer transistors Q8 & Q9 (66382) only when DISPLAY MARKER SWITCH is depressed.



DATE REV CHANGE
5-27-77 A INCORP ECN 2073 TJT
B INC ECN 3382 RLD
C INC ECN #3606
D INC ECN 4003
8/1/85 E INC ECN 6578
FROM IF SWEEP OUT P4-9
SCOPE SWEEP
160 MHz
180 - 240 MHz
FROM IF TUNER OUTPUT
J51
L1 Paul Smith SK 618-3 (YELLOW)
L8 Paul Smith SK 618-5 (VIOLET)
CR1 PC0605D
CR2 PC0600D
Q1 66382
Q2 3N201
Q3 66382
Q4 66382
Q5 66382
Q6 66382
Q7 2N2222
Q8 66382
Q9 66382
R8 3.16 K S.A.T.
R4 5K
SWEEP WIDTH
160 MHz CUT OFF
240 MHz CUT OFF
F_c = 100 MHz
MIXER BALANCE
IF OUT #1 J53
IF OUT #2 (J48) J54
DISPLAY MARKER
TO COUNTER P4-6
J55 MARKER OUT
MARKER FREQ.
X1 FAIRCHILD MC7908CP
C40-41 1uf 35V tant.
MC7908CP
X2 MC1658
CHIP
C34 5.5-18pf s.c. trimmer
PC BD 1-25-0071
LAST USED NO.
Q9
X2
CR6
L11
R41
C44
1 1 25-0105- IF & MARKER OSC
ITEM REQ'D PART NO. DESCRIPTION
LIST OF MATERIALS
TOLERANCES
-IFR INC-
WICHITA, KANSAS
IF & MARKER OSC.
(SCHEMATIC)
C

Fig. 8-31

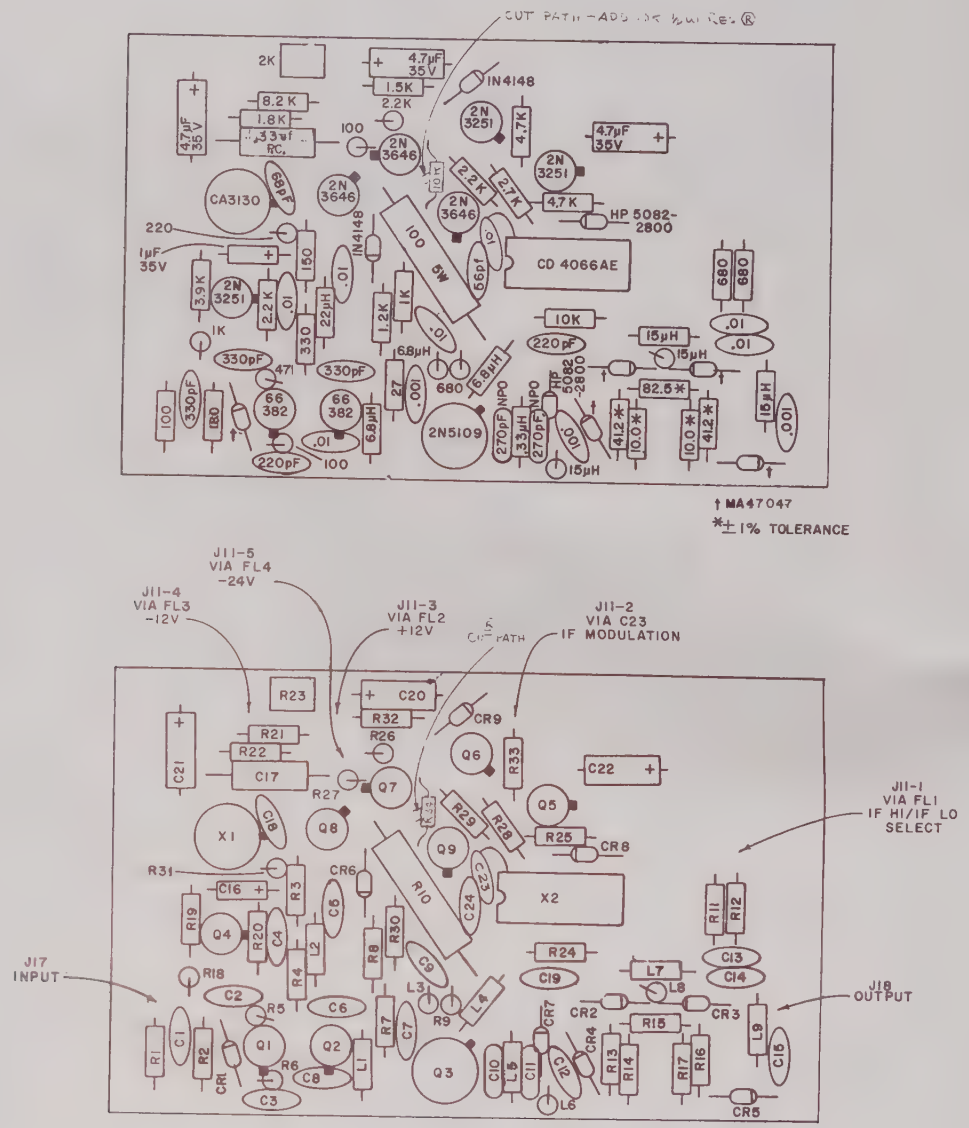


Fig. 8-32 IF GENERATOR POWER AMP BOARD PARTS LAYOUT (7010-2517-300-R)

IF GENERATOR POWER AMP THEORY OF OPERATION

(RD-300)

3-25-103

1-1. Introduction.

1-2. The IF Power Amplifier of the RD-300 levels and pulse modulates the 20 to 70 MHz output of the IF Oscillator. The IF Power Amplifier also contains a 40 dB attenuator. This attenuator is used to provide the lower output levels for IF LO mode operation.

2-1. Power Amp Operation.

2-2. Unmodulated 20 to 70 MHz RF from the IF Oscillator is inputted on J17. This signal is attenuated by a voltage divider consisting of R2 and the RF resistance of CR1 (MA47047). The RF resistance of CR1 is current dependent and is modulated by a leveling amplifier consisting of X1 (CA3130) and Q4 (2N3251A). X1 compares the detected RF level at the cathode of CR7 (HP2800) to a d.c. level on X1 pin 3. The d.c. level on X1 pin 3 is controlled by the IF LEVEL CAL pot R23. The output of X1 varies so as to keep the d.c. levels on X1 pins 2 &3 equal. The output at J18 may be set during calibration to +20 dBm for IF inputs ranging from -10 dBm to approximately +3 dBm.

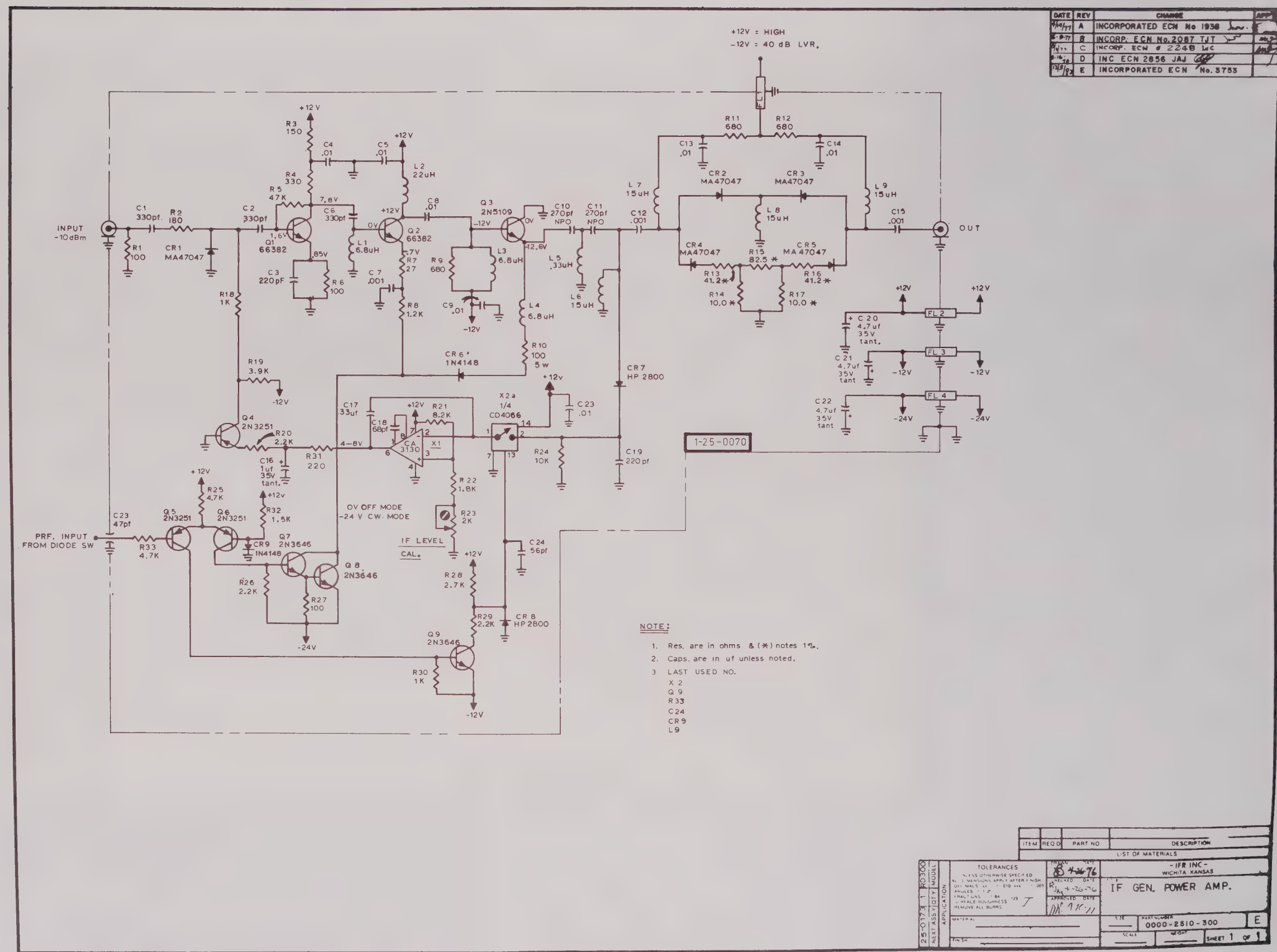
2-3. When a positive PRF signal or a positive CW signal from the Range Contour Board is applied to the base of Q5 (2N3251A), Q5 is biased to turn OFF. With Q5 OFF, the emitter of Q6 (2N3251A) is pulled toward +12V by R25. At this time, buffer drive transistors Q7 & Q8 (2N3646) are biased to turn ON. This causes the emitters of Q2 (66382) & Q3 (2N5109) to be brought to a low voltage level. When this happens, Q2 & Q3 are biased ON. With Q2 & Q3 biased ON, the IF frequency at the base of Q1 is amplified buffered and applied to the output network.

2-4. With a positive PRF pulse or positive CW input from the Range Contour Board, Q9 is biased OFF. At this time, X2a pin 13 (CD4066) is pulled toward +12V by R28. This causes X2a to close and allows the output of the buffer amplifier to be sampled. Sampling takes place only when IF frequencies are being processed by Q1, Q2 & Q3.

2-5. When a positive PRF pulse or positive CW input is not present on the base of Q5, X2a is open and Q2 & Q3 are biased OFF.

2-6. The output of Q3 is applied to a high pass filter composed of C10, C11 and L5. In the IF HIGH mode, CR2 & CR3 (MA47047) are forward biased sufficiently to pass the amplified and modulated IF signal. At this time, CR4 & CR5 (MA47047) are reversed biased.

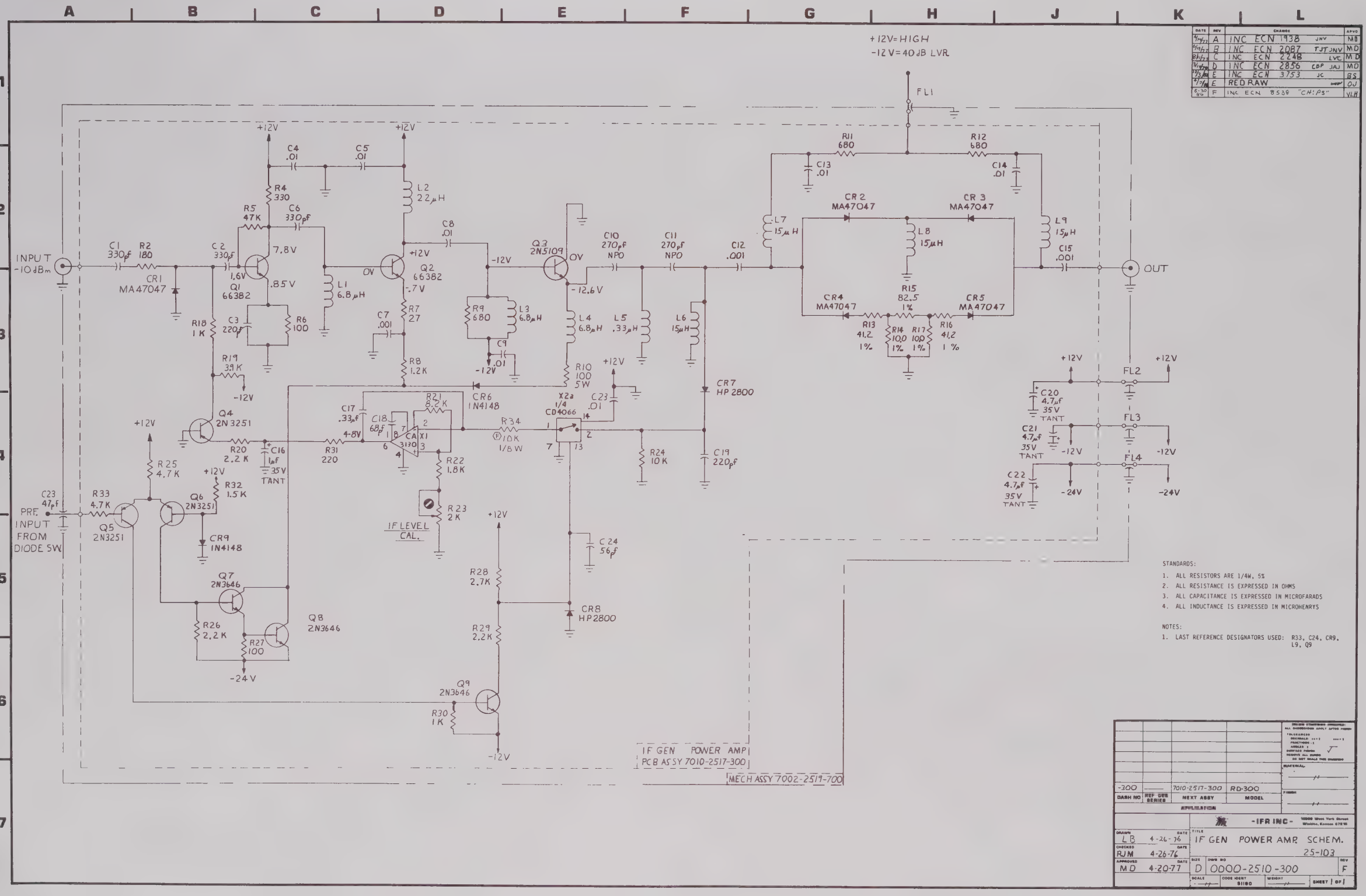
2-7. In the IF LO mode, CR4 and CR5 are forward biased sufficiently to pass the amplified and modulated IF signal through a 40 dB attenuator composed of R13-R17. During IF LO operation, CR2 & CR3 are reversed biased and do not transmitt the IF signal.



DATE REV CHANGE
A INCORPORATED ECN No 1938
B INCORP. ECN No. 2087 TJT
C INCORP. ECN # 2248 LC
D INC ECN 2856 JAJ
E INCORPORATED ECN No. 3753
+12V = HIGH
-12V = 40 dB LVR.
INPUT -10dBm
OUT
PRF. INPUT FROM DIODE SW
0V OFF MODE
-24 V CW. MODE
IF LEVEL CAL.
1-25-0070
NOTE:
1. Res. are in ohms & (*) notes 1%.
2. Caps. are in uf unless noted.
3 LAST USED NO.
X 2
Q 9
R 33
C 24
CR 9
L 9
ITEM REQ'D PART NO DESCRIPTION
LIST OF MATERIALS
TOLERANCES
- IFR INC -
WICHITA KANSAS
IF GEN. POWER AMP.
0000-2510-300
E
SHEET 1 OF 1

Fig. 8-33

02



+12V=HIGH
-12V=40dB LVR
INPUT -10dBm
PRE INPUT FROM DIODE SW
OUT
IF LEVEL CAL.
IF GEN POWER AMP PCB ASSY 7010-2517-300
MECH ASSY 7002-2519-700
STANDARDS:
1. ALL RESISTORS ARE 1/4W, 5%
2. ALL RESISTANCE IS EXPRESSED IN OHMS
3. ALL CAPACITANCE IS EXPRESSED IN MICROFARADS
4. ALL INDUCTANCE IS EXPRESSED IN MICROHENRYS
NOTES:
1. LAST REFERENCE DESIGNATORS USED: R33, C24, CR9, L9, Q9
-IFR INC-
IF GEN POWER AMP. SCHEM.
25-103
0000-2510-300

Fig. 8-33-1

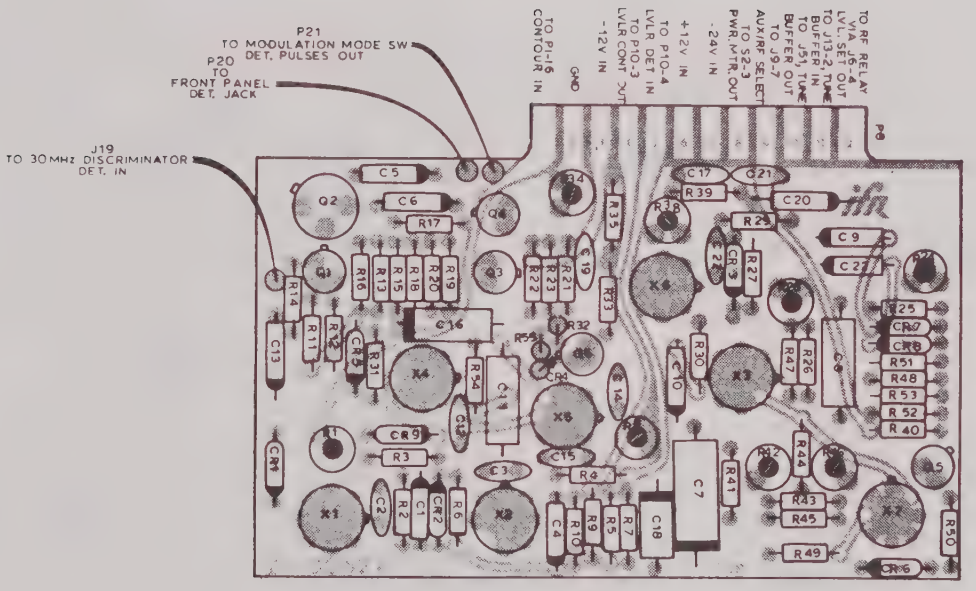


FIG. 8-34-1 AUXILIARY BOARD PARTS LAYOUT
EFFECTIVE TO S/N 213

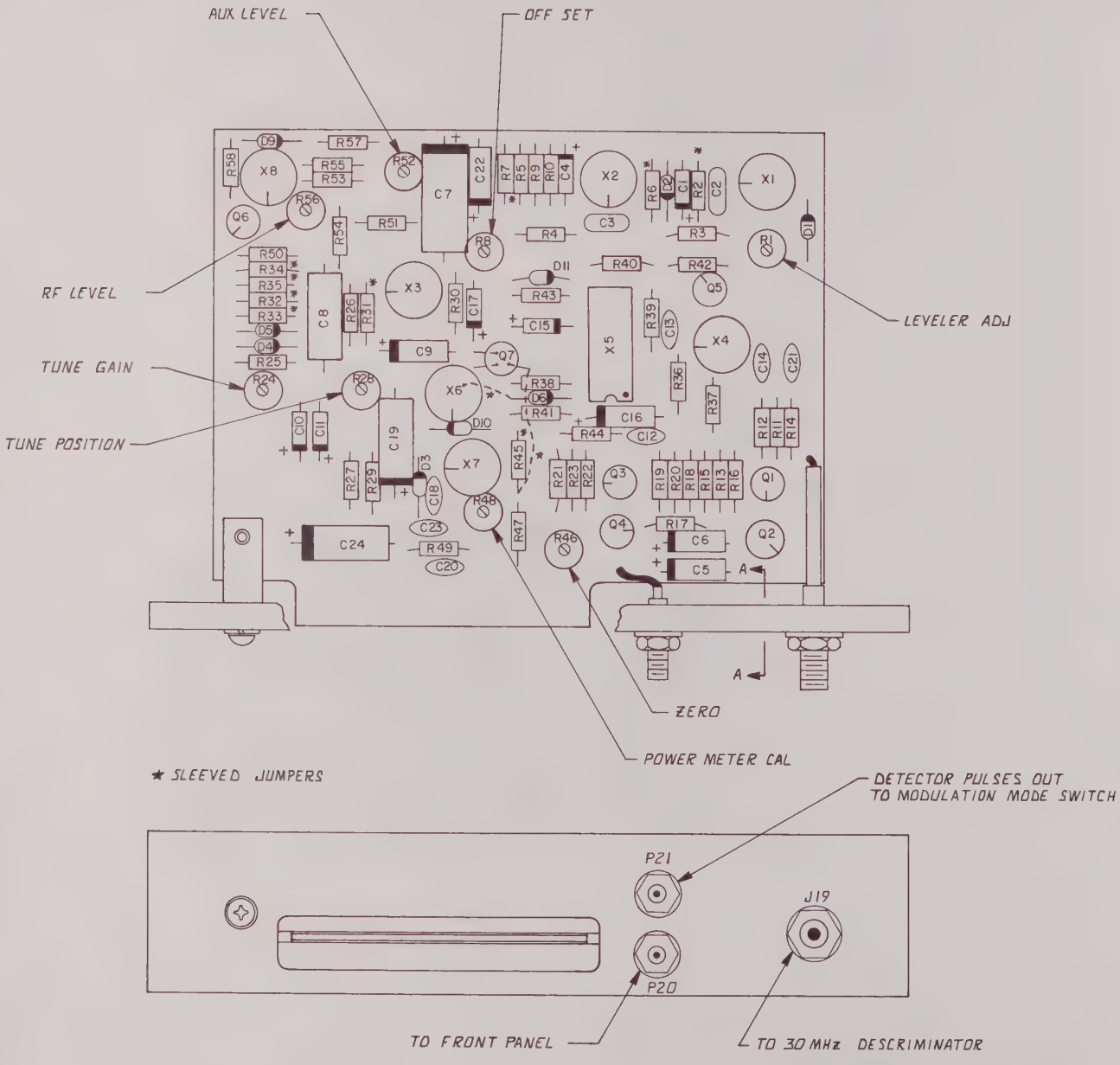


Figure 8-34-2 AUXILIARY BOARD PARTS LAYOUT
(7010-2517-400-V)

AUXILIARY BOARD THEORY OF OPERATION

RD-300

(3-25-119)

1-1. Introduction.

1-2. The RD-300 AUX Board contains the Power Meter Circuit, the Contour Leveler Circuit, The IF Oscillator Tuner Circuit, and the System Level Switching Circuit.

2-1. Contour Leveler Circuit Operation.

2-2. The logaritmic control voltage from the Contour Circuit on the Range and Contour Board is applied to the noninverting (+) input of buffer X1 (CA3130). The output of X1 is applied to the inverting (-) input of voltage comparitor X2 pin 2 (CA3130). The leveler detector output of the VCO Module is also applied to X2 pin 2. The negative voltage output of X2 is used to control the output level of the VCO Module. X2's output voltage slews until the voltage present on X2 pin 2 is equal to O.V. During calibration, the input level to X1 pin 3 may be adjusted by the LEVELER ADJ pot R1 and a d.c. offset voltage may be applied to X2 pin 2 by the OFFSET pot R8.

3-1. IF Oscillator Tuner Operation.

3-2. The output from the Tune Buffer Circuit on the Sweep and Bias Board is applied to the inverting (-) input of X3 pin 2 (72741). The negative voltage output of X3 is then routed to the IF TUNE input of the IF and MARKER Oscillator. During calibration, the controlled voltage swing of the output of X3 may be adjusted by TUNE POSITION pot R28. Diodes D4 and D5 (1N4148) insure that no positive voltage is applied to the IF TUNE input of the IF and MARKER Oscillator.

4-1. System Level Switching Operation.

4-2. The system Level Switching Circuit is used to properly bias the Diode Switch in conjunction with the AUX RF/IF MODE SELECTOR SWITCH on the Front Panel. When the AUX switch is in the RF position, Q6 (2N2222) is Biased OFF. With Q6 biased OFF, one side of the RF LEVEL pot R56 is pulled toward +12V by R54. This allows the RF Level Control voltage from X6 (72741) to be adjusted by R56 during calibration.

4-3. When the AUX RF/IF MODE SELECTOR SWITCH is in the AUX position, Q6 is turned ON. This disables the RF LEVEL pot R56 by bringing one end to ground and enables the output of X6 to be set by the AUX LEVEL pot R53 during calibration.

5-1. Power Meter Circuit Operation.

5-2. Detected Radar pulses from the 30 MHz Pulse Discriminator, are peak detected by X4 (3100), X5 (74121), Q5 (2N3251A) and X6 (72741). The Detected Radar pulses are applied to X4 pin 2. When the voltage of the pulses exceed the d.c. level on X4 pin 3, the output of X4 goes negative. The negative output pulses trigger one-shot X5. When the output of X5 goes positive, Q5 is turned OFF. With Q5 OFF, C17 is allowed to begin charging. C17 charges until the d.c. level on X4 pin 3 is equal to the peak dectected pulse level. At this time, X5 is not triggered. When the system stabalizes, the output of X5 has about a 50% duty cycle

5-3. During calibration, a compensation voltage is added to the input of buffer X7 (CA3130). This voltage is added to the peak detecter output of X6 to fit the detector voltage vs. power curve to the meter scale.

DATE	REV	CHANGE	APP'D
8-7-76	A	INCORP ECN #1597	
8-27-76	B	INC ECN #1644	
10-7-76	C	INCORP ECN No. 1671	
2-23-77	D	INC ECN #1748	

TO LEVELER DETECTOR P10-3

TO LEVELER CONTROL P10-1

FROM DET. J22

TO FRONT PANEL DET. JACK J67

FROM CONTOUR CKT. P1-18

P8-1

R1 10K LEVELER ADJ.

C1 1uf 35V tant.

C2 47pf sm

D2 HP2800

R2 150 *

R3 560K

R4 560K

R5 10K *

R6 10K *

C3 68pf sm

C4 1uf 35v tant.

R7 680K

R8 50K OFFSET

R9 220

R10 1K

D1 1N5240

X1 CA 3130

X2 CA 3130

CONTOUR-LEVELER CKT.

J19

P20

Q1 2N5179

Q2 2N2405

R11 22K

R12 1K

R13 220

R14 6.8K

R15 100

R16 1K

R17 47

R18 1K

C5 6.8uf tant.

C6 6.8uf tant

R19 470K

R20 150

R21 4.7K

R22 2.2K

R23 4.7K

Q3 2N3646

Q4 2N3646

DET. BUFFER

P21

TO MODULATION MODE SWITCH S-8 J7-3

TUNE GAIN

FROM. TUNE BUFFER J13-6

R24 20K

R25 15K

R26 27K

C8 .1 mylar

X3 741

R47 220K *

R48 20.0K *

R51 4.75K *

R52 56.2K *

R53 56.2K *

C7 47uf 20V tant.

C9 1uf 35V tant.

C10 6.8uf 35V tant.

C22 1µf 35V tant.

R27 3.3K

R28 10K TUNE POSITION

R29 4.7K

R30 100

D3 1N5231 5V

D7 1N4148

D8 1N4148

IF OSC TUNER

TO IF OSC. TUNELINE J-51

J9-5

P/O S9 AUX.

R40 10K

R41 3.3K

R42 10K

R43 39K AUX LEVEL

R44 3.3K

R45 39K

R46 10K RF LEVEL

Q5 2N2222

X7 72741

D6 MA47047

R49 120R

R50 680

SYSTEM LEVEL SWITCHING

TO LEVEL SET ON DIODE SWITCH

C16 10uf 20V tant.

C17 .01

C18 10uf 20V tant

C19 .01

C20 4.7uf 35V tant

C21 .01

1-25-0062 P/C BD

R54 2.2K

R55 4.7K

R32 33

Q6 2N3646

C12 .01

C14 47pf sm

C15 .01

X4 3100T

X5 CA 3130

D4 1N4148

D9 IN5234B 6.2 V

C11 .33 pc

R31 10MEG

C13 1uf 35V tant

D5 1N5240 10V

POWER CIRCUIT

R34 20K ZERO

R35 150K

R33 4.75K *

X6 CA 3130

C23 470pf S.M.

R38 2K POWER METER CAL.

R39 4.7K (S.A.T.)

ΔF

PWR

S2

J2

EFF: To S/N 213

1	1	3-25-0119	AUXILIARY BOARD SCHEMATIC

- ITR INC -

AUX. BOARD (PWR. DET., IF TUNE., LEVEL CONTL., DET. BUFF.) SCHEMATIC

C 3-25-0119 C

1 1

Fig. 8-35-1

DATE	REV	CHANGE	APP'D
8-7-76	A	INCORP ECN#1597 WW RKK	MD
8-27-76	B	INC ECN #1644 RKK WW	MD
9-30-76	C	INCORP ECN No. 1671 Jnv WW	MD
2-23-77	D	INC ECN #1940	MD
7-12-77	E	INC ECN # 2152	MD
9-9-77	F	INCORP ECN # 2299 WC	MD
1-4-78	G	INCORP ECN # 2693 AA dgp	WW
5-3-79	H	INC. ECN # 3346 RLD	BB
12-7-79	J	INC ECN # 3432 RLD	/
3-10-80	K	INC ECN # 3448 RLD	/
6-5-80	L	INC ECN 3466 RLD	/
8-8-80	M	INC ECN 3707 RR	/

TO LEVELER DETECTOR P10-4

TO LEVELER CONTROL P10-3

FROM DET. J22

TO FRONT PANEL DET. JACK J67

FROM CONTOUR CKT. P1-16

CONTOUR-LEVELER CKT.

DET. BUFFER

TUNE GAIN

IF OSC TUNER

FROM. TUNE BUFFER J13-6

TUNE POSITION

TO IF OSC. TUNELINE J-51

TO MODULATION MODE SWITCH S-8 J7-5

SYSTEM LEVEL SWITCHING

ZERO

NARROW PULSE PEAK DETECTOR

AUX LEVEL

RF LEVEL

S.A.T.

TO LEVEL SET ON DIODE SWITCH

1-25-0062 P/C BD

EFFECTIVE S/N 213 & ON

1	1	3-25-0119	AUXILIARY BOARD SCHEMATIC
RD-300 / 1-25-0174		10-14-76	- IFR INC -
		RDM 9/26/78	AUX. BOARD (PWR. DET., IF TUNE., LEVEL CONTL., DET. BUFF.) SCHEMATIC
		MD 8/7/79	C 0000-2511-900 M
			1 1

Fig. 8-35-2

FIG. 8-36 900 MHz LOCAL OSCILLATOR BOARD PARTS LAYOUT

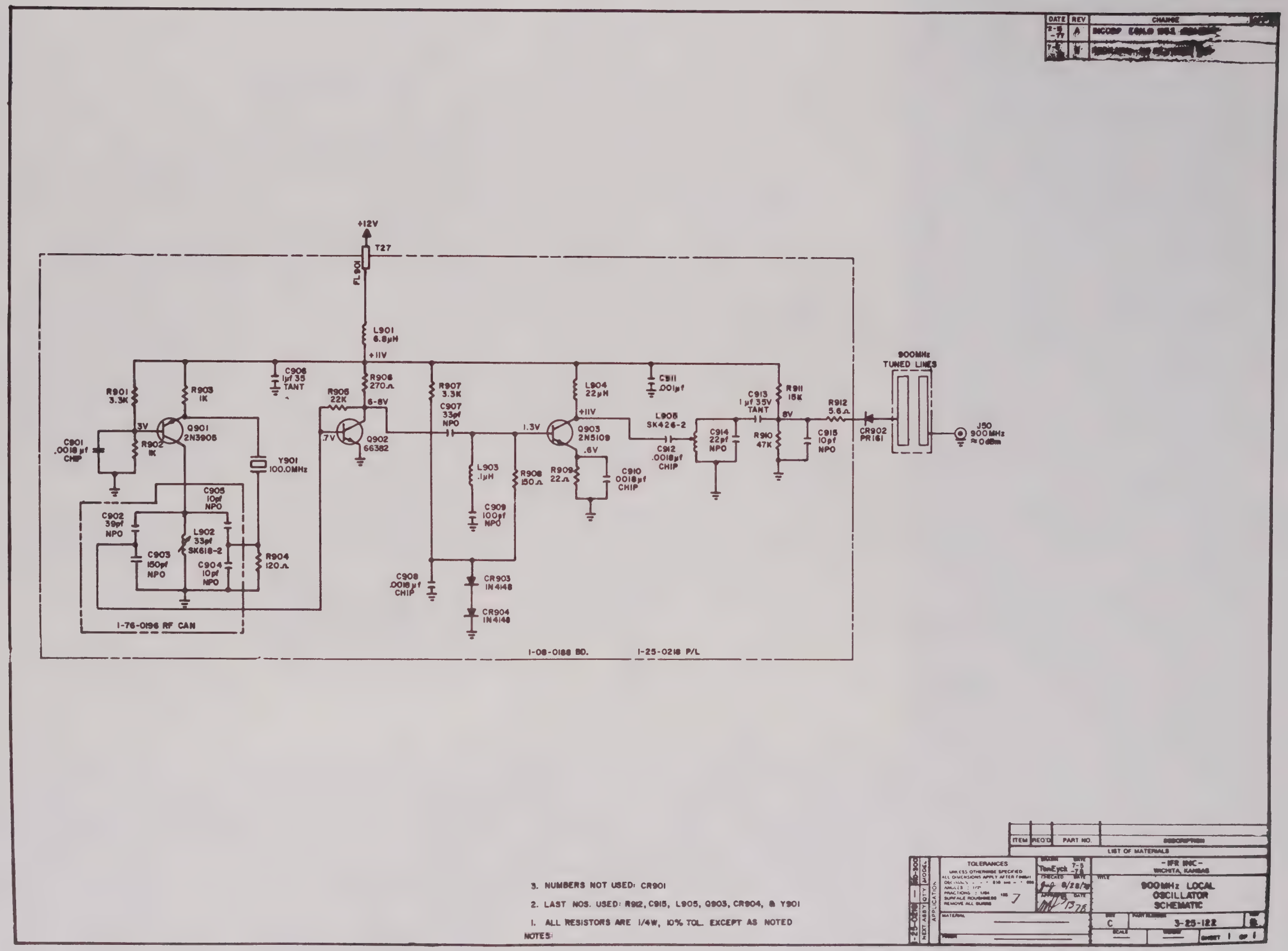

+12V
T27
FL901
L901
6.8μH
+11V
R901
3.3K
R903
1K
C906
1μf 35
TANT
R905
22K
R906
270Ω
6-8V
R907
3.3K
C907
33pf
NPO
L904
22μH
C911
.001μf
C913
1μf 35V
TANT
R911
15K
R912
5.6Ω
900MHz
TUNED LINES
3V
Q901
2N3905
C901
.0018μf
CHIP
R902
1K
Y901
100.0MHz
.7V
Q902
66382
1.3V
Q903
2N5109
+11V
L905
SK426-2
C912
.0018μf
CHIP
C914
22pf
NPO
R910
47K
8V
C915
10pf
NPO
CR902
PR161
J50
900MHz
≈0dBm
L903
.1μH
R908
150Ω
R909
22Ω
.6V
C910
.0018μf
CHIP
C909
100pf
NPO
C905
10pf
NPO
C902
39pf
NPO
L902
33pf
SK618-2
C903
150pf
NPO
C904
10pf
NPO
R904
120Ω
C908
.0018μf
CHIP
CR903
1N4148
CR904
1N4148
1-76-0196 RF CAN
1-08-0188 BD.
1-25-0218 P/L
3. NUMBERS NOT USED: CR901
2. LAST NOS. USED: R912, C915, L905, Q903, CR904, & Y901
1. ALL RESISTORS ARE 1/4W, 10% TOL. EXCEPT AS NOTED
NOTES:
ITEM
REQ'D
PART NO.
DESCRIPTION
LIST OF MATERIALS
TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
SURFACE ROUGHNESS
REMOVE ALL BURRS
7
TenEyck
7-5-78
8/28/78
13/78
-IFR INC-
WICHITA, KANSAS
900MHz LOCAL
OSCILLATOR
SCHEMATIC
C
3-25-122
SHEET 1 OF 1
NEXT ASSY
QTY
MODEL
APPLICATION
MATERIAL
FINISH

Fig. 8-37

DATE	REV	CHANGE	APPD
3-15-76	A	REVISED PER RJM WW	
6-16-76	B	REVISED PER RJM WW	RJM
9-9-76	C	INCORP. ECN# 1683 WW	RJM
9-20-76	D	INCORP. ECN# 1697 WW RKK	RJM
6-18-77	E	INC ECN 2670 JW	JW
10/25/78	F	INC ECN 3232 AF A JW	WW

I. PORT 26
SIGNAL GENERATOR INPUT

A. PORT 26 – PORT 24 INSERTION LOSS — 21.0 dB MAXIMUM

B. PORT 26 – PORT 25 INSERTION LOSS — 16.0 dB MAXIMUM

C. FREQUENCY SENSITIVITY

L-BAND INPUT AT J-26 (MHz)	X-BAND OUTPUT AT J-24 (GHz)	SENSITIVITY (dB)
1045-1060	9.295-9.310	±1.5
1060-1150	9.310-9.40	±1.0
1150-1175	9.40-9.425	±1.5

II. PORT 27
XMTR SAMPLE OUT

A. SATURATED PEAK POWER AT PORT 27 DUE TO 5W TO 60 W Pk PULSES AT PORT 24 — -9 dBm MINIMUM

III. PORT 28
LOCAL OSCILLATOR INPUT

A. POWER — +7dBm ±3dB

B. FREQUENCY — 8.250 GHz

C. PORT 28 VSWR — 1.3 : 1 MAX.

IV. PORT 25
AUXILIARY RF OUTPUT

A. VSWR (9295-9425 GHz) — 1.5 : 1 MAX

B. RF INPUT POWER — SAME AS PORT 24 WITHOUT MIXER BURNOUT OR DAMAGE

C. UP CONVERSION SATURATION LEVEL WITH J-24 AT +15 dBm (1045-1175 MHz) — -10 dBm MINIMUM

V. PORT 24
A. RF INPUT/OUTPUT
POWER INCIDENT UPON PORT 5 WITH NO DAMAGE TO MIXER (PRF = 400 HZ, PULSE WIDTH = 3.5 μS TYP.) — 5 TO 60 W Pk NOMINAL, 100W Pk MAXIMUM

B VSWR — 1.4 : 1 MAX.

VI PORT 23
SPECTRUM ANALYZER OUTPUT

A. INSERTION LOSS PORT 24 - PORT 23 — 42 ± 4 dB

B. EXTERNAL TERMINATION - PORT WILL BE OPEN EXCEPT WHEN TEST SET OPERATOR IS USING A SPECTUM ANALYZER. AN OPEN CIRCUIT SHOULD NOT INFLUENCE SIGNAL TO THE DETECTOR.

VII PORT 22
DETECTOR OUT PUT

A. PORT 24 - DETECTOR COUPLING — 30 dB NOMINAL, FLAT WITHIN ±0.4 dB (9.295-9.425 GHz): FINAL CHOICE SHOULD INSURE THAT DETECTOR REMAINS IN ITS LINEAR RANGE FOR INPUTS AT PORT 24 FROM 5 TO 60W pk.

LINEARITY — WITH A 150 OHM LOAD RESISTOR TO GROUND AND A 22KΩ BIAS RESISTOR TO -12V, THE DETECTOR OUTPUT SHALL HAVE THE FOLLOWING CHARACTERISTICS:
1. MINIMUM OUTPUT VOLTAGE WITH 5W pk INPUT TO J-24 ..... 0.27 V_{PP}
2. A PLOT ON LOG-LOG SCALES OF THE P-P DETECTED VOLTAGE, Vd, VERSUS PEAK POWER, P_{PK}, AT J-24 SHALL BE A STRAIGHT LINE: EACH Vd DATA POINT SHALL BE WITHIN ±10% OF A BEST FIT STRAIGHT LINE DRAWN THRU THE DATA, AND THE DATA SHOULD SHOW NO COMPRESSION AT THE UPPER POWER LEVELS. THE SLOPE, K, OF THE STRAIGHT LINE SHALL BE 0.5 ± 0.15 WHERE: $K = \log \frac{Vd\,(50w)}{Vd\,(5w)}$

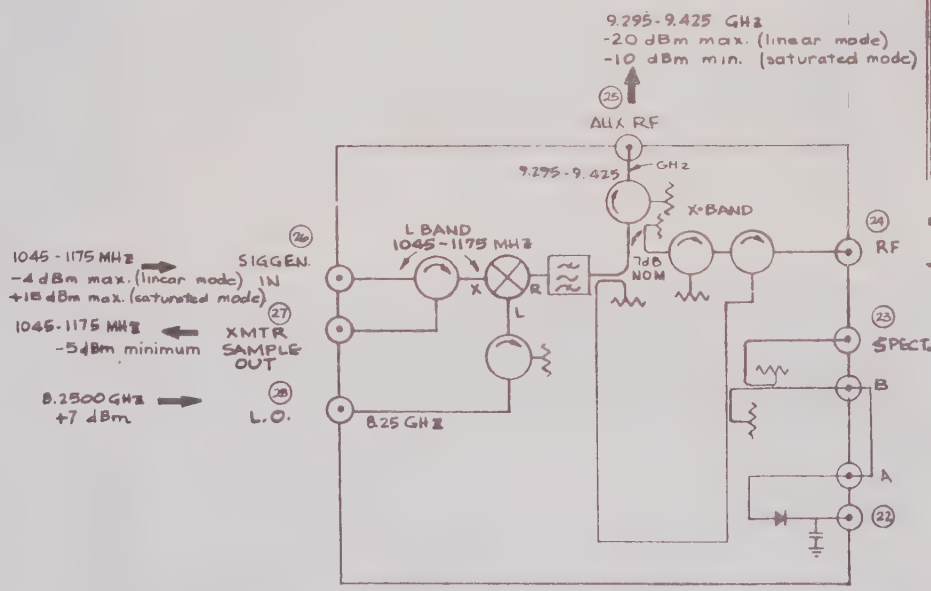
VIII. MISC.
A BANDPASS FILTER CHARACTERISTICS:
PASSBAND: 9.295-9.425 GHz
OUT OF BAND ATTENUATION: FILTER ATTENUATION SUFFICIENT TO REDUCE LO POWER (+7dBm, 8.25GHz AT J-28) TO LESS THAN -38 dBm AT J-25.
> 12 dB FROM 7.075 TO 7.205 GHz

B. SPURIOUS OUTPUTS AT PORT 24 OR 25 DUE TO SIGNAL GENERATOR INPUT AT PORT 26 — -30 dBc MAX. FROM 9.295-9.425 GHz

C. L-BAND CIRCULATOR ISOLATION (1045-1125 MHz) — 17dB MINIMUM

D. CONNECTORS — SMA FEMALE

E. TEMP. RANGE — 0-50° C



X-Band Front End effective in units S/N 101 and on. For specific details of changes after S/N 101, see block diagrams in Section IV.

25-0192	1	RD 300	1	1	25-0116	BLOCK DIA, X-BAND FRONT END
NEXT ASS'Y	QTY	MODEL	ITEM	REQ'D	PART NO	DESCRIPTION

APPLICATION — LIST OF MATERIALS

TOLERANCES UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH DECIMALS .xx ± .010 .xxx ± .005 ANGLES ± 1/2° FRACTIONS ± 1/64 SURFACE ROUGHNESS 125 REMOVE ALL BURRS

DRAWN SIMMONS 9/11/75 CHECKED 10-13-75 APPROVED 10-20-75

MATERIAL — TREATMENT — FINISH —

INSTRUMENT FLIGHT RESEARCH CORPORATION WICHITA, KANSAS

TITLE: X BAND FRONT END (PROPOSED)

SIZE C | PART NUMBER 3-25-0116 | REV F | SCALE — | WEIGHT — | SHEET 1 OF 2

Fig. 8-38

X-BAND FRONT END THEORY OF OPERATION

RD-300

(3-25-116)

1-1. Introduction.

1-2. The X-Band Front End is a microwave stripline module containing a number of passive components. Construction of the X-Band Front End is of a sandwich made from two Teflon fiberglass printed circuit boards printed with signal paths, filter resonators and directional couplers. The printed circuit boards also contain cutouts for the circulator, ferrite plugs, mixer diodes and detector diodes. The X-Band Front End module is sealed except for an access plug for detector and mixer diode replacement.

1-3. The X-Band Front End contains a mixer that is used to translate the L-Band signal generator input on port 26 up to X-Band frequencies. This mixer is also used to convert the transmitter sample frequencies on port 24 down to L-Band frequencies. In addition, the X-Band Front End contains directional couplers that feed the Spectrum Analyzer Output port (23) and a Detector Output port (22). XMTR Sample and AUX RF Outputs, and input for the 8.2500 GHz Local Oscillator are also provided. The AUX RF Output port (25) provides a X-Band output for general signal generator applications with an output level calibrated at the connector.

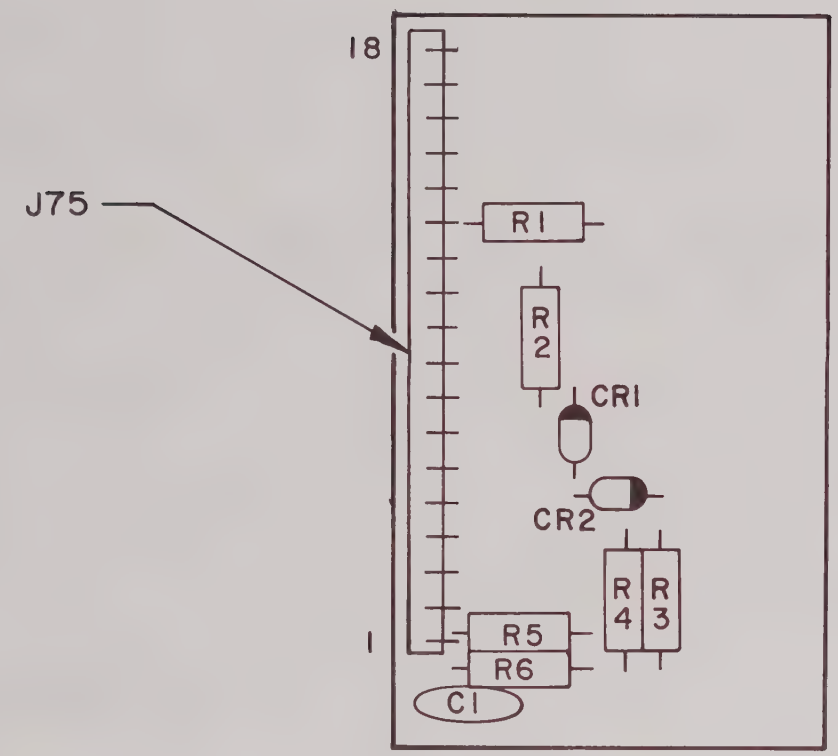
1-4. For the RD-300 to generate the same frequency the radar is transmitting, it is necessary to sample the radar frequency and compare it to the VCO frequency. Changes in radar frequency are also determined by this method, and the VCO frequency is automatically corrected by the RD-300.

2-1. X-Band Front End Operation.

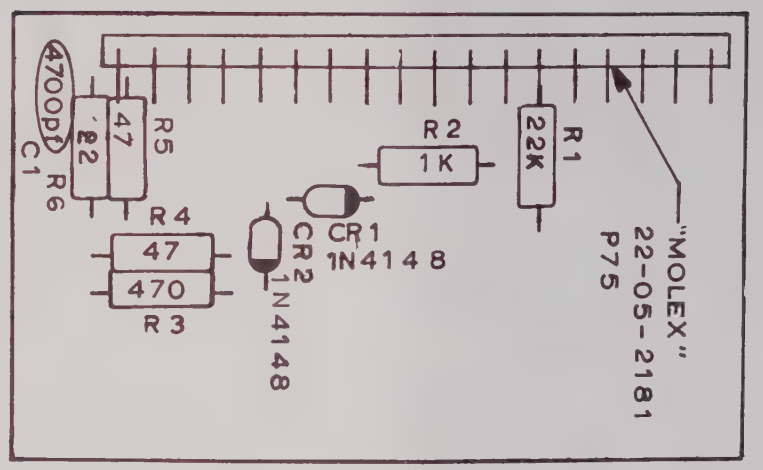
2-2. RF energy from the L-Band signal generator enters the mixer via the L-Band circulator and bandpass filter in the X-Band Front End. This is mixed with the 8.2500 GHz signal and passes through a X-Band filter. After passing through the X-Band filter, the signal is split into two paths. The Auxiliary 9.295-9.425 GHz Output passes through the mainline of the 7 dB coupler (no attenuation) to an isolator. The isolator protects the mixer from accidental connection to the Magnetron . The residual signal going "backwards" through the isolator is reduced by a minimum of 17 dB.

2-3. The 7 dB coupler sidearm output passes to the RF port (24) and the radar under test's receiver via the 20 dB coupler mainline and a dual isolator.

2-4. Magnetron pulses from the radar under test are reduced 20 dB by an external cross guide coupler. The output of the coupler is applied to the RF port (24). From the RF port, the signal is directed by a circulator to the 30 dB coupler. The output of the 30 dB coupler passes through the 20 dB coupler, the 7 dB coupler and the mixer to the L-Band circulator. The L-Band circulator directs the output to the XMTR SAMPLE OUT port (J27). The path loss for the magnetron pulses is such that the mixer is saturated to radars with 1 kW to 12 kW output. This keeps the mixed-down signal level at the XMTR SAMPLE OUT port (27) essentially constant at about -9 dBm peak.

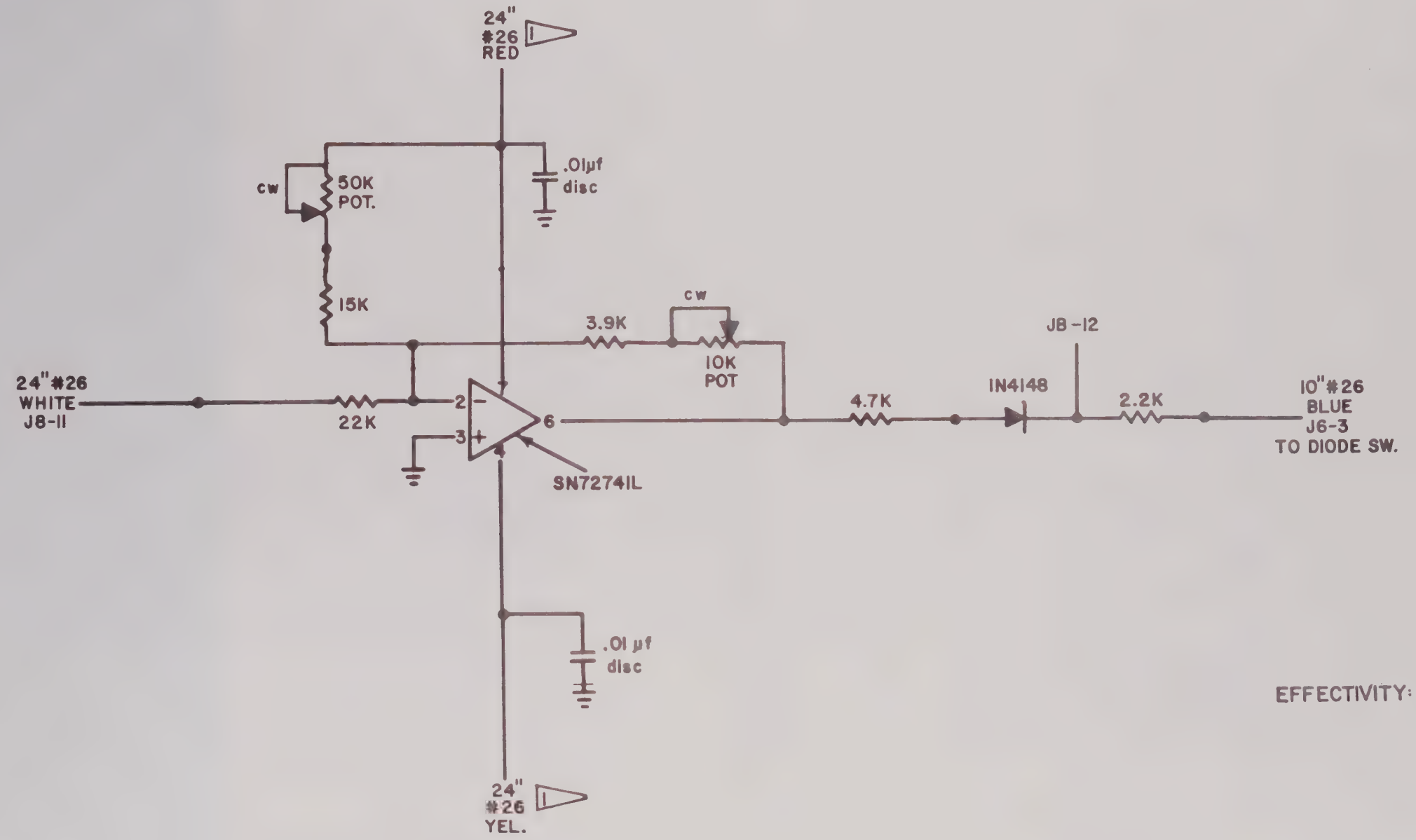


(7010-2524-700-C)



(7010-2524-700-B)

Fig. 8-39 WIRE HARNESS COMPONENT INTERCONNECT BOARD PARTS LAYOUT



EFFECTIVITY: INSTALLED AT MANUFACTURER'S OPTION PRIOR TO S/N 200

THESE WIRES LACED TOGETHER

ITEM	REQ'D	PART NO.	DESCRIPTION

LIST OF MATERIALS

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: .xx = ± .010 .xxx = ± .005
ANGLES: ± 1/2°
FRACTIONS: ± 1/64
SURFACE ROUGHNESS 125 J
REMOVE ALL BURRS

DRAWN Terry K. DATE 10-13-78
CHECKED DATE 10-16-78
APPROVED DATE 10-16-78

-IFR INC-
WICHITA, KANSAS

TITLE
FRONT END
COMPENSATION
SCHEMATIC

MATERIAL
FINISH

SIZE B | PART NUMBER 025-1178-047 | REV —
SCALE — | WEIGHT — | SHEET 1 OF 1

NEXT ASSY | QTY | MODEL | APPLICATION

Fig. 8-40

SECTION IX

PARTS LIST

9.1 INTRODUCTION. The parts list included in this section is a listing primarily of active components and those which may require replacing. Other mechanical parts are listed on mechanical assembly drawings in the last portion of this section. Table 9-1, at the conclusion of the parts list, is a recommended spares level for one year for the RD-300 RADAR bench test set. Unless otherwise indicated, the parts listed herein are valid for all RD-300 test sets. Effectivities for each assembly or group of components are indicated at the beginning of each listing where necessary.

9.2 Front Panel Assy.

Dwg. and Ref. Symbol	Part No.	IFR Stock No.	Description	Qty. Per Assy
4-25-108		1-25-168	Front Panel Assy.	REF.
J-64, 65	UG-1094/U		• BNC Connector, AMPHENOL/Equiv. (SCOPE HORIZ, DLYD SYNC, SYNC, & EXT)	4
J-67, 69 & 78	4-70-36		• BNC Connector, TED/Equiv. (DET, DISC OUT, & IF)	3
(See Dwg. 3-25-0107)	90EA1C4-F3JRNA		• Lighted Switch, MASTER SPEC/Equiv. (LINE)	1
R-9	RV6LAY SA502A		• Potentiometer, CLAROSTATE/Equiv. (DISC. CAL)	1
R-5 & 7		1-76-058	• 10 Turn Pot., ELECTRO TECH/Equiv. (MKR TUNE, MAN FREQ. coarse.)	2
R-6		1-76-265	• Potentiometer CLAROSTAT/Equiv. (MAN FREQ fine)	1
R-8 & S-6		1-76-016-2	• Potentiometer CLAROSTAT/Equiv. (CONTOUR)	1
R-2		1-76-019-2	• Potentiometer, CLAROSTAT/Equiv. (PRF)	1
R-4 & S-7		1-76-083	• Potentiometer, CLAROSTAT/Equiv. (SWEEP WIDTH MHz)	1
R-3		1-76-021	• Potentiometer CLAROSTAT/Equiv. (WIDTH µs)	1
R-11		1-76-171	• Potentiometer CLAROSTAT/Equiv. (ANT RATE)	1

Dwg. and Ref. Symbol	Part No.	IFR Stock No.	Description	Qty. Per Assy.
S-4,8, & 9	30-1		• Switch GRAYHILL/ Equiv. (DISPLAY MKR. & Left & Right Aut. Quadrant Selections)	3
S-5 A & B	CK7201		• Switch DPDT, C & K/ Equiv. (PRF-RF)	1
		1-25-194	• Antenna Synchro Connector Assy.	1
P-73	165-27		• • 24 position male Connector, AMPHENOL/ Equiv.	1
P-75	22-01-2181		• • 18 position Connec- tor MOLEX/Equiv.	1
	08-56-0110		• • • Crimp Terminal MOLEX/Equiv.	1
		1-25-151	• RF Mode Switch Assy.	1
		1-25-068	• • RF Mode Switch Mother Board	1
	041173		• • 7 Sect. Pushbutton Switch Assy., CENTRALAB/Equiv.	1
	22-05-2181		• • 18 position Con- nector MOLEX/Equiv.	1
		1-25-150	• Modulation Mode Switch Assy.	1
		1-25-067	• • Mod. Mode Switch Mother Board	1
	22-05-2181		• • 18 Position Con- nector, MOLEX/Equiv.	1
	041366		• • 5 Sect. Pushbutton Switch Assy., CEN- TRALAB/Equiv.	1
S-1	CK7101		• Switch SPDT, CK/Equiv. (µs-Miles)	1

Dwg. and Ref. Symbol	Part No.	IFR Stock No.	Description	Qty. Per. Assy
S-2	CK7101		• Switch SPDT, CK/ Equiv. (PWR-ΔF)	1
S-3 & 12 & R-1	86C2DE-20A15/R71		• Potentiometer w/DPST switch (ΔF)	1
M-1		3-76-097-2	• Meter w/IFR scale	1
R-10		1-76-262	• Potentiometer, (AUX RANGE)	1
		1-25-152	• Antenna Angle Select Switch Assy.	1
		1-25-069	• • Antenna Angle Sel. Sw. Mother Bd.	1
P-80	22-05-2101		• • 10 position Connector, MOLEX/ Equiv.	1
	177606MN		• • Switch Section, EECO/Equiv.	2
	78SM-2		• • Fast Mount Assy. Kit. EECO	1
	191611		• • Stop Pin	2
		1-25-195	• Wire Harness Assy.	1
J-13	205203-1		• • 9 pin female Connector, AMP/Equiv.	1
J-14	205206-1		• • 15 pin, male Connector, AMP/ Equiv.	1
J-2	205205-1		• • 15 pin, female, Connector, AMP/ Equiv.	1
J-1	205207-1		• • 25 pin female Connector, AMP/ Equiv.	1

Dwg. and Ref. Symbol	Part No.	IFR Stock No.	Description	Qty. Per Assy
	66505-3 or 66505-9		• • Crimp terminal (#26) female, AMP/ Equiv.	44
	205206-1		• • Crimp terminal (#22) Male, AMP/ Equiv.	10
J-3, 5, 10 11, 12, & 13	03-06-2055		• • Connector, MOLEX/ Equiv.	6
	02-06-2132		• • • Crimp pins, MOLEX/Equiv.	27
J-8	09-01-1121		• • Edge Connector, (12 pin) MOLEX/ Equiv.	1
	08-06-0106		• • • Crimp terminal MOLEX/Equiv.	12
J6 &80	22-01-2101		• • Cable connector (10 pos.) MOLEX/ Equiv.	2
J4, 7, 9, 75, 77, & 78	22-01-2181		• • Connector, Female (18 pin) MOLEX/ Equiv.	6
	08-56-0110		• • • Crimp terminals MOLEX/Equiv.	
	A-250		• • Blade Connector T & B/Equiv.	3
(See dwg. 2-25-247)	5082-4684		• • LED red HP/Equiv.	10
	5082-4984		• • LED green HP/Equiv.	1
		1-25-247	• • Wire Harness Component Interconnect PC. Bd. Assy.	1
		1-25-072	• • • Interconnect P.C. Bd.	1

Dwg. and Ref. Symbol	Part No.	IFR Stock No.	Description	Qty. Per Assy.
X-7	SN7400		• • • IC, TI/Equiv.	1
CR-1	1N4148		• • • Diode, DICK-SON/Equiv.	1
R-7	62-1-1-103		• • • Trimpot, SPECTROL/Equiv.	1
	22-05-2181		• • • Connector, MOLEX/Equiv.	1
3-25-051		1-25-178	• • Counter Display P.C. Bd. Assy.	1
		1-25-051	• • • Counter Display P.C. Board	1
	CS-352		• • • Socket, Beckman/Equiv.	3
	SP-352		• • • Display, Beck-man/ Equiv.	3
1-25-100		1-25-169	• Range/Contour Assy	1
		1-25-170	• • Range/Contour Module A P.C. Bd.	1
		1-25-054	• • • Range/Contour Module A P.C. Bd.	1
	1-380737-0		• • • XTAL Socket AMP/ Equiv.	2
Y-1		3-76-063-33	• • • XTAL 3.2365 MHz	1
X- 1, 3, & 10	SN7400		• • • IC, TI/Equiv.	3
X-2, 4, 5, & 6	SN74190		• • • IC, TI/Equiv.	4
X-7 & 9	SN7473		• • • IC, TI/Equiv.	2
X-8	SN7490		• • • IC, TI/Equiv.	1
X-11	SN74121		• • • IC, TI/Equiv.	1
X-12	SN7420		• • • IC, TI/Equiv.	1

Dwg. and Ref. Symbol	Part No.	IFR Stock No.	Description	Qty. Per Assy
CR-1 thru 4	1N4148		• • • Diode, DICKSON/Equiv.	4
S-1 thru S-4	H76M184		• • • Switch Assy. EECO/Equiv.	1
1-25-100		1-25-171	• • Range/Contour Module B P.C. Bd Assy	1
		1-25-055	• • • Range/Contour Module B P.C. Bd.	1
Y-1		3-76-063-60	• • • XTAL, 10 MHz (McCOY W6)	2
Q-1,2 3 & 5	2N3905		• • • Transistor, NATIONAL/Equiv.	4
Q-4	2N3903		• • • Transistor, NATIONAL/ Equiv.	1
Q-6 & 9	2N2222		• • • Transistor, MOTOROLA/Equiv.	2
Q-7 & 8	2N3251		• • • Transistor, NATIONAL/Equiv.	1
X-1,2, & 3	SN7490		• • • IC, TI/Equiv.	3
X-4	SN7402		• • • IC, TI/Equiv.	1
X-5, 6, & 7	SN74121		• • • IC, TI/Equiv.	3
CR-1 & 2	1N270		• • • Diode, DICKSON/Equiv.	2
CR-3	1N4148		• • • Diode, DICKSON/Equiv.	1
C-5	DV11P35D		• • • Trimmer Cap. JFD/Equiv.	1
R-23	62-2-1-501		• • • Trimpot, SPECTROL/Equiv.	1

PARTS LIST

Dwg. and Ref. Symbol	Part No.	IFR Stock No.	Description	Qty. Per Assy.
1-25-100		1-25-172	• • Range/Contour Module C P.C. Bd. Assy.	1
		1-25-056	• • • Range/Contour Module C P.C. Bd.	1
Q-1 & 2	2N2222		• • • Transistor, MOTROLA/Equiv.	2
Q-3 & 4	2N3646		• • • Transistor, GE/Equiv.	2
Q-5	2N3903		• • • Transistor, NATIONAL/Equiv.	1
Q-6	2N3905		• • • Transistor, NATIONAL/Equiv.	1
CR-1	1N4148		• • • Diode, DICKSON/Equiv.	1
X-1 & 3	SN7400		• • • IC, TI/Equiv.	2
X-2	SN7420		• • • IC, TI/Equiv.	1
X-4 & 5	CA3130		• • • IC, TI/ Equiv.	2
X-6	LM741		• • • IC, RCA/Equiv.	1
X-7	8049		• • • IC, INTERSIL/ Equiv.	1
R-20	62-1-1-501		• • • Trimpot, SPECTROL/Equiv.	1
R-36 & R-7	62-1-1-503		• • • Trimpot, SPECTROL/Equiv.	2
R-39	62-1-1-102		• • • Trimpot, SPECTROL/Equiv.	1
P-1	205737-1		• • • 25 Posidion Male Connector, AMP/ Equiv.	1

PARTS LIST

Dwg. and Ref. Symbol	Part No.	IFR Stock No.	Description	Qty. Per Assy.
			Knobs & Dial Assys.	
		2-25-014	• Contour Dial Assy.	1
		2-25-012	• Dial Assy. Sweep Width	1
		2-25-010	• Dial Assy. Width	1
		2-25-034	• Dial Assy. 1dB Stepped Atten. (12 position)	1
		2-25-264	• Dial Assy. 1dB Stepped Atten. (10 position)	1
		2-25-263	• Dial Assy. 10 dB Stepped Atten.	1
		2-25-238	• Dial Assy. PRF	1
		1-09-220	• Freq. knob, Man	1
		1-00-057-3	• Knob, Mkr Freq.	1
		1-09-219-1	• Knob Assy., ΔF, Aux. Range, Ant Rate, and Fine Man. Freq.	4

9.3 Rear Panel Assy.

Dwg. and Ref. Symbol	Part No.	IFR Stock No.	Description	Qty. Per Assy.
3-25-107		1-25-190	Rear Panel Assy.	REF.
	STSM-2C4		• Teflon terminal (SEALECTRO/Equiv.)	2
P-52	160-5		• AC plug, AMPHENOL/Equiv.	1
	HKP		• Fuse holder, BUSS/Equiv.	1
F-1	MDL-1		• • Fuse, 1 A Slo-blo BUSS/Equiv.	1
X-3	LAS-18A12		• -12V dc Regulator LAMBDA/Equiv.	1
Q-1	2N4398		• Transistor, NATIONAL/Equiv.	1
X-2	LAS15A12		• +12Vdc Regulator LAMBDA/Equiv.	1
X-4	LAS1505		• +5 Vdc Regulator LAMBDA/Equiv.	1
X-1	LAS1824		• -24 Vdc Regulator LAMBDA/Equiv.	1
T-1		2-76-120	• Transformer, NT1891 NATIONAL XFMR/Equiv.	1
CR-1, 2 & 3	PK-10		• 6 A Bridge Rectifier VARO/Equiv.	3
P-82	03-06-1055	1-25-253-1	• Connector, (110 Vac) MOLEX/Equiv.	1
	02-06-1132		• • Crimp pins	4
P-82	03-06-1055	1-25-253-2	• Connector, (220 Vac)	1
	02-06-1132		• • Crimp pins	4

PARTS LIST

Dwg. and Ref. Symbol	Part No.	IFR Stock No.	Description	Qty. Per. Assy.
J-14	205205-1		• 15 Position Female Connector	1
CR-6	1N5171		• Diode, DICKSON/Equiv.	1
CR-4 & 5	1N4148		• Diode, DICKSON/Equiv.	1
3-25-107		1-00-160	• 170 V dc Power Supply P.C. Board Assy.	1
		1-00-159	• • 170 Vdc Power Supply P.C. Board	1
Q-1	40321		• • Transistor, RCA/ Equiv.	1
CR-1	1N4004		• • Diode MOTROLA/ Equiv.	1
CR-2, 3 & 4	1N4148		• • Diode, DICKSON/ Equiv.	3
CR-5	1N5278		• • Zener Diode, 170 V DICKSON/Equiv.	1

9.4 Floor Assy.

Dwg. and Ref. Symbol	Part No.	IFR Stock No.	Description	Qty. Per Assy.
		1-25-192	Floor Assy.	REF.
2-25-115		1-25-181	• Main Diode Switch Assy.	1
		1-25-063	• • Main Diode Switch P.C. Bd.	1
CR-1 & 3	PSO-83B		• • Diode, PARAMETRICS/ Equiv.	2
CR-2, 4 & 5	FPS-700-08		• • Diode, PARAMETRICS/ Equiv.	3
		1-25-259	• High Isolation Diode Switch Option	REF.
		2-25-258	• High Isolation Diode Switch Assembly	1
		2-25-256	• • Diode Switch block	1
	CM-943		• • • Diode switch Module, CROWN/ Equiv.	1
3-25-112		1-25-196	• 900 MHz Local Oscillator Assy.	1
		3-18-167	• • Oscillator Mult. block	1
CR-902	PR-161		• • Diode, PARAMETRICS/ Equiv.	1
		1-25-218	• • 900 MHz Local Osc. P.C. Bd. Assy.	1
		1-08-188	• • • Osc. Mult. P.C. Bd.	1
Q903	2N5109		• • • Transistor, MOTOROLA/Equiv.	1
Q902	66382		• • • Transistor, RCA/Equiv.	1

Dwg. and Ref. Symbol	Part No.	IFR Stock No.	Description	Qty. Per Assy.
Q901	2N3905		• • • Transistor, NATIONAL/Equiv.	1
Y901		3-76-063-76	• • • Crystal, 100.0 MHz K-W/Equiv.	1
CR-3 & 4	1N4148		• • • Diode	2
	380598-1		• • • Receptacle, AMP/Equiv.	2
2-25-121		1-25-188	• VCO Module Assy.	1
J-10	60-9939-090		• • SMA Female Connector AEP/Equiv.	1
FL-1 thru FL-4	51-712-001		• • Feedthru Filter	4
VCO		2-76-008	• • VCO, VTS-116S SOLID STATE/Equiv.	1
		1-00-053	• • 40dB Isolator	1
	315-10002-3		• • Relay, AMPHENOL/ Equiv.	1
		1-25-041	• • Semi-Rigid Coax. Assy.	1
		1-25-042	• • Semi-Rigid Coax. Assy.	1
		1-25-043	• • Semi-Rigid Coax. Assy.	1
		1-25-203	• • Semi-Rigid Coax. Assy.	1
		1-25-044-1	• • Flexible RF Cable Assy.	1
		1-25-044-2	• • Flexible RF Cable Assy.	2
J-10	03-06-1055		• • 5 pin Connector, MOLEX/Equiv.	1

PARTS LIST

Dwg. and Ref. Symbol	Part No.	IFR Stock No.	Description	Qty. Per Assy.
2-25-121		1-25-183	• • Leveler/Distribution Module Assy.	1
		1-25-066	• • • Leveler/Dist. Module P.C. Bd.	1
		1-76-061-1	• • • Female SMA Modified Connector, AMERICON/Equiv.	4
C-1 & 4	FA5C-102W		• • • Feedthru Cap., ALLEN BRADLEY/ Equiv.	2
CR-1 & 2	PSO-83D		• • • Diode, MICROWAVE ASSOC./Equiv.	2
CR-3	5082-2800		• • • Diode, HP/Equiv.	1
3-25-120		1-25-189	• Single Sideband Module Assy.	1
			• • 275 MHz B.P. Filter	REF.
L-1, 2, & 3		1-76-264	• • • Coil Assy.	3
C-1, 2, & 3	VC26G		• • • Trimmer Caps JFD/Equiv.	3
3-25-120		1-25-187	• • Discriminator Diode Switch P.C. Bd. Assy.	1
		1-25-061	• • • Disc. Diode P.C. Bd.	1
MX-1	MD-113		• • • Mixer, ANZAC/ Equiv.	1
X-1	GPD-402		• • • AMP., AVANTEK/ Equiv.	1
CR-1 & 2	MA47047		• • • Diode, MICROWAVE ASSOC./Equiv.	2
	7273		• • • Trimmer Cap. JOHNSON/Equiv.	1
3-25-120		1-25-185	• • 275 MHz Osc. P.C. Board Assy.	1

PARTS LIST

Dwg. and Ref. Symbol	Part No.	IFR Stock No.	Description	Qty. Per Assy.
		1-25-060	• • • 275 MHz Osc. P.C. Bd.	1
C-7 & 8	VC26G		• • • Trimmer Caps. JFD/Equiv.	2
Y-1		3-76-063-31	• • • Crystal, 91.6666MHz	1
Q-1	2N3905		• • • Transistor, NATIONAL/Equiv.	1
Q-2 & 3	66382		• • • Transistor, RCA/ Equiv.	2
X1	MD-113		• • • Mixer, ANZAC/ Equiv.	1
	PSO-83B		• • • Diode, PARAME- TRICS/Equiv.	1
3-25-120		1-25-186	• • 305 MHz Oscillator P.C. Board Assy.	1
		1-25-060	• • • 305MHz Osc. P.C. Board	1
C-7 & 8	VC26G		• • • Trimmer Caps	2
		3-76-063-32	• • • Crystal, 101.6666 MHz	1
Q-1	2N3905		• • • Transistor, NATIONAL/Equiv.	1
Q-2 & 3	66382		• • • Transistor, RCA/Equiv.	2
MX-1	MD-113		• • • Mixer, ANZAC/ Equiv.	1
3-25-120	5BC835/130		• • Bandpass Filter, TEXAN/Equiv.	1
		2-25-215	• • Semi-Rigid Coax. Assy.	1

PARTS LIST

Dwg. and Ref. Symbol	Part No.	IFR Stock No.	Description	Qty. Per Assy.
		2-25-216	• • Semi-Rigid Coax. Assy.	1
	03-06-1055		• • 5 position Connector, MOLEX/Equiv.	1
2-25-118		1-25-182	• Sweep and Bias Control Circuit P.C. Bd. Assy.	1
		1-25-059	• • Sweep and Bias control Ckt. P.C. Bd.	1
X-1	SN72741L		• • IC, TI/Equiv.	1
Q-1 & 2	2N3251		• • Transistor, NATIONAL/Equiv.	1
Q-3	SJE1461		• • Transistor, MOTOROLA/Equiv.	1
R-12	62-1-1-203		• • Trimpot, SPECTROL/Equiv.	1
R-13	62-1-1-103		• • Trimpot, SPECTROL/Equiv.	1
P-13	205733-1		• • 9 position Male Connector, AMP/ Equiv.	1
3-25-105		1-25-175	• IF and Marker Oscillator P.C. Board Assy.	1
		1-25-071	• • IF and Marker Oscillator P.C. Bd.	1
X-1	MC7908		• • Volt. Regulator MOTOROLA/Equiv.	1
X-2	MC1658		• • IC, MOTOROLA/ Equiv.	1
Q-1, 3 thru 6, 8 & 9	66382		• • Transistor, RCA/ Equiv.	7

Dwg. and Ref. Symbol	Part No.	IFR Stock No.	Description	Qty. Per Assy.
Q-2	40673		• • Transistor, RCA/ Equiv.	1
Q-7	2N2222		• • Transistor, MOTOROLA/Equiv.	1
CR-1	PCO-605D		• • Diode, PARAMETRICS/ Equiv.	1
CR-2	PCO-600D		• • Diode, PARAMETRICS/ Equiv.	1
CR-3	1N823		• • Diode, DICKSON/ Equiv.	1
CR-4 5 & 6	MA47047		• • Diode, DICKSON/ Equiv.	3
R-24	62-1-1-103		• • Trimpot, SEPCTROL/ Equiv.	1
P-3	03-06-1055		• • 5 pin Connector, MOLEX/Equiv.	1
3-25-103		1-25-173	• IF Generator Power AMP. P.C. Bd. Assy.	1
		1-25-070	• • IF Gen. Pwr. Amp. P.C. Board	
X-1	CA3130		• • IC, RCA/Equiv.	1
X-2	CD4066		• • IC, RCA/Equiv.	1
Q-1 & 2	66382		• • Transistor, RCA/ Equiv.	1
Q-3	2N5109		• • Transistor, MOTOROLA/Equiv.	1
Q-4 & 5 & 6	2N3251		• • Transistor, NATIONAL/Equiv.	3
Q-7, 8 & 9	2N3646		• • Transistor, GE/ Equiv.	3
CR-1 thru CR-5	MA47047		• • Diode, MICROWAVE ASSOC./Equiv.	5

PARTS LIST

Dwg. and Ref. Symbol	Part No.	IFR Stock No.	Description	Qty. Per Assy.
CR-6 & 9	1N4148		• • Diode, DICKSON/ Equiv.	2
CR-7 & 8	5082-2800		• • Diode, HP/Equiv.	2
R-23	62-2-1-202		• • Trimpot, SPECTROL/Equiv.	1
J-1	03-06-1055		• • 5 position Connector, MOLEX/Equiv.	1
3-25-119		1-25-174	• Auxiliary Ckt. Bd. Assy. (Contour Leveler ckt., IF Osc. tuner, System Level switching, Detector Buffer, and Power Circuit.)	1
		1-25-062	• • Aux. Ckt. P.C. Bd.	1
X-1,2, & 7	CA3130T		• • IC, RCA/Equiv.	3
X-3,6 & 8	SN72741L		• • IC, TI/Equiv.	3
X-4	CA3100T		• • IC, RCA/Equiv.	1
X-5	SN74121N		• • IC, TI/Equiv.	1
Q-1	66382		• • Transistor, RCA/ Equiv.	1
Q-2	2N2405		• • Transistor, MOTOROLA/Equiv.	1
Q-3 & 4	2N3646		• • Transistor, GE/ Equiv.	2
Q-5	2N3251A		• • Transistor, NATIONAL/Equiv.	1
Q-6 & 7	2N2222		• • Transistor, MOTOROLA/Equiv.	2
D-1	1N5240B		• • Zener Diode, 10V DICKSON/Equiv.	1

Dwg. and Ref. Symbol	Part No.	IFR Stock No.	Description	Qty. Per Assy.
D-2	5082-2800		• • Diode, HP/Equiv.	1
D-3 & 6	1N5231B		• • Zener Diode, 5.1V DICKSON/Equiv.	2
D-4,5, 10 & 11	1N4148		• • Diode, DICKSON/Equiv.	4
D-9	MA47047		• • Diode, MICROWAVE Assoc./Equiv.	1
R-1, 28, 52 & 56	62-1-1-103		• • Trimpot SPECTROL/Equiv.	4
R-8	62-1-1-503		• • Trimpot, SPECTROL/Equiv.	1
R-24 & 46	62-1-1-203		• • Trimpot, SPECTROL/Equiv.	2
R-48	62-1-1-102		• • Trimpot, SPECTROL/Equiv.	1
3-25-104		1-25-176	• Marker Prescaler P.C. Bd. Assy.	1
		1-25-058	• • Prescaler P.C. Board	1
Q-1 thru Q5	66382		• • Transistor, RCA/ Equiv.	5
X-1	MC12013		• • IC, MOTOROLA/Equiv.	1
X-2 thru X-5,7 & 8	SN74S112		• • IC, TI/Equiv.	6
X-6	SN7400		• • IC, TI/Equiv.	1
CR-1,2 & 3	HP2800		• • Diode, HP/Equiv.	3
J-5	03-06-1055		• • 5 pin Connector MOLEX/Equiv.	1
3-25-101		1-25-242	• 30 MHz Discriminator Assy. (Effective sets prior to S/N 109)	1
		3-25-037-1	• • Enclosure	1

PARTS LIST

Dwg. and Ref. Symbol	Part No.	IFR Stock No.	Description	Qty. Per Assy.
J-2	205206-1		• • 15 pin Connector AMP/Equiv.	1
		1-25-184	• • 30 MHz Pulse Disc. P.C. Board Assy.	1
		1-25-065	• • • 30 MHz Pulse Disc. P.C. Board	1
X-1	MC10116		• • • IC, MOTOROLA/ Equiv.	
X-2 & 3	CA3130		• • • IC, RCA/Equiv.	2
X-4 & 7	5558 or MC1458P		• • • IC, MOTOROLA/ Equiv.	2
X-5 & 8	SN72741L		• • • IC, TI/Equiv.	2
X-6	CD4016AE		• • • IC, RCA/Equiv.	1
X-9	SN74S00		• • • IC, TI/Equiv.	1
Q-1,2 &3	2N5179		• • • Transistor, RCA/ Equiv.	3
Q-4,5,6 7 & 21	2N2222		• • • Transistor, MOTOROLA/Equiv.	5
Q-8,9 & 13	2N3646		• • • Transistor, GE/Equiv.	3
Q-10,11 & 20	UC714		• • • Transistor NATIONAL/Equiv.	3
Q-12	2N3251		• • • Transistor, NATIONAL?Equiv.	1
Q-14 & 19	2N3905		• • • Transistor, NATIONAL/Equiv.	2
Q-15,17 & 18	2N3903		• • • Transistor, NATIONAL/Equiv.	3
Q-16	2N2905		• • • Transistor, RCA/ Equiv.	1

PARTS LIST

Dwg. and Ref. Symbol	Part No.	IFR Stock No.	Description	Qty. Per Assy.
CR-1,3 4,11, & 12	HP2800		• • • Diode, HP/Equiv.	5
CR-2	PCO-605D		• • • Diode, PARAMETRICS/ Equiv.	1
CR-5 thru 9 & 13	1N4148		• • • Diode, DICKSON/Equiv.	5
CR-10	1N5234		• • • Diode, DICKSON/Equiv.	1
R-6 & 73	62-1-1-201		• • • Trimpot, SPECTROL/Equiv.	2
R-30	62-1-1-503		• • • Trimpot, SPECTROL/Equiv.	1
R-42 &81	62-1-1-103		• • • Trimpot, SPECTROL/Equiv.	2
4-25-124			• 30 MHz Discriminator Assy. (Effective sets S/N 109 & on)	1
P-2	205206-1		• • 15 pin Connector	1
		1-00-167-350	• • Semi-Rigid Coaxial cable (Bd A)	1
J-56	529001		• • SMA Blkhd connector, CABLEWAVE SYSTEMS/ Equiv. (Bd A)	1
		1-25-240	• • 30 MHz Discr. Bd. A P.C. Board Assy.	1
		1-25-065	• • • 30 MHz Bd. A P.C. Board	1
X-1	10116		• • • IC, MOTOROLA/ Equiv.	1
X-2	MC1496P		• • • IC, MOTOROLA/ Equiv.	1
X-3	CA3100T		• • • IC, RCA/Equiv.	1

PARTS LIST

Dwg. and Ref. Symbol	Part No.	IFR Stock No.	Description	Qty. Per Assy.
X-4 & 6 thru 10	CA3130T		• • • IC, RCA/Equiv.	6
X-5	CD4066		• • • IC, RCA/Equiv.	1
Q-1,2,4 & 5	66382		• • • Transistor, RCA/ Equiv.	4
Q-3	2N3646		• • • Transistor, GE/ Equiv.	1
Q-6	2N2222		• • • Transistor, MOTOROLA/Equiv.	1
Q-7	2N3251		• • • Transistor, MOTOROLA/Equiv.	1
Q-8 & 9	2N4223		• • • Transistor, NATIONAL/Equiv.	2
Q-10	2N3903		• • • Transistor NATIONAL/Equiv.	1
CR-1	HP2800		• • • Diode, HP/Equiv.	1
CR-2	1N4148		• • • Diode, DICKSON/ Equiv.	1
CR-3	FD333		• • • Diode,FAIRCHILD/ Equiv.	1
R-7	62-1-1-201		• • • Trimpot, SPECTROL/Equiv.	1
R-36	62-1-1-204		• • • Trimpot, SPECTROL/Equiv.	1
R-66	62-1-1-103		• • • Trimpot, SPECTROL/Equiv.	1
		1-25-241	• • 30 MHz Discr. Bd. B P.C. Board Assy.	1
		1-25-057	• • • 30 MHz Discr. Bd.B P.C. Board	1
X-1 & 2	CA3130T		• • • IC, RCA/Equiv.	2
X-3	CA3100T		• • • IC, RCA/Equiv.	1

Dwg. and Ref. Symbol	Part No.	IFR Stock No.	Description	Qty. Per Assy.
X-4	CD4001		• • • IC, RCA/Equiv.	1
X-5 thru 9	CD4047AE		• • • IC, RCA/Equiv.	5
X-10 & 11	MC1458		• • • IC, MOTOROLA/ Equiv.	2
Q-1,2,3, & 6 thru 10	2N3646		• • • Transistor, GE/ Equiv.	8
Q-4	2N3905		• • • Transistor, NATIONAL/Equiv.	1
Q-5 & 12	2N3903		• • • Transistor, NATIONAL/Equiv.	2
Q-13,14, & 15	2N3251		• • • Transistor, NATIONAL/Equiv.	3
CR-1 thru 7	1N4148		• • • Diode, DICKSON/Equiv.	7
CR-8	FD333		• • • Diode, FAIRCHILD/ Equiv.	1
CR-9	1N5238		• • • Zener Diode 8.7V, DICKSON/Equiv.	1
R-33	62-1-1-501		• • • Trimpot, (round) SPECTROL/Equiv.	1
R-41	62-1-1-503		• • • Trimpot, (round) SPECTROL/Equiv.	1
R-44	62-1-1-502		• • • Trimpot (round) SPECTROL/Equiv.	1
		3-25-116	• X-Band Front End MPS-517, MICROWAVE/ Equiv.	1
	315-10002-3		• Coaxial Relay (IF-RF) AMPHENOL/Equiv.	1

PARTS LIST

Dwg. and Ref. Symbol	Part No.	IFR Stock No.	Description	Qty. Per Assy.
		3-76-241	• 8.25 GHz Oscillator, NARDA/Equiv. or 8.25 GHz Oscillator, SST/Equiv. for units thru S/N 295	1
		3-76-336	• 8.25 GHz Oscillator, Effective all units S/N 296 & on	1
J-27 to J-63		1-25-223	• Semi-Rigid Coax. Assy. (X-band front end to SSB module)	1
J-31 to J-32		2-25-227	• Semi-Rigid Coax. Assy. (IF-RF Relay to Diode Switch)	1
J-26 to J-30		3-25-231	• Semi-Rigid Coax. Assy. (X-band front end to Diode Switch)	1
J-28 to J-29		2-25-230	• Semi-Rigid Coax. Assy. (X-band front end to RF source on units prior to S/N 296)	1
J-28 to J-29		2-25-266	• Semi-Rigid Coax. Assy. (X-band front end to RF Source on units S/N 296 & on)	1

9.5 Servo Simulator P.C. Bd. Assy.

Dwg. and Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy.
		1-25-167	Servo Simulator P.C.	REF.
		3-25-064	• Servo Simulator P.C. Board	1
X-1 thru 4, & 6, 7, & 8	CD4008		• IC, RCA/Equiv.	7
X-5 & 15	CD4078		• IC, RCA/Equiv.	2
X-9 & 10	CD4029		• IC, RCA/Equiv.	2
X-11	CD4027		• IC, RCA/Equiv.	1
X-12 & 13	SN7404		• IC, TI/Equiv.	2
X-14	CD4001		• IC, RCA/Equiv.	1
X-16 & 20	CD4077		• IC, RCA/Equiv.	2
X-17 & 22	SN74C902		• IC, TI/Equiv.	2
X-18 & 23	MM5232AE1		• IC, MOTOROLA/Equiv.	2
X-19	CD4049		• IC, RCA/Equiv.	1
X-24 & 31	CD4016		• IC, RCA/Equiv.	2
X-21	CD4068		• IC, RCA/Equiv.	1
X-25, 28 30, 32, 36	5558		• IC, MOTOROLA/Equiv.	5
X-26, 27 & 37	AD7520		• IC, RCA/Equiv.	3
X-29 & 35	6N139		• IC, HP/Equiv.	2
X-33, 34, 38 39, 41, thru 44	6N138		• IC, HP/Equiv.	8
X-45 & 46	CA3130		• IC, RCA/Equiv.	2
X-47 & 48	LM1877		• IC, NATIONAL/Equiv.	2

PARTS LIST

Dwg. and Ref. Symbol	Part No.	IFR Stock No.	Description	Qty. Per Assy.
Q-1 thru 7	2N2222		• Transistor, MOTOROLA/Equiv.	7
CR-1 thru 4 & 8 thru 11	1N4148		• Diode, DICKSON/Equiv.	8
CR-5,6 & 7	5082-2800		• Diode, HP/Equiv.	3
CR-12	1N5231		• Diode, DICKSON/Equiv.	1
R-85	62-1-1-103		• Trimpot, (round)	1
T-1		1-76-263	• Wound Bobin Assy.	1
T-2	NT2961		• Transformer, NATIONAL XFMR/Equiv.	1
T-3 & 4	NT3062		• Transformer, NATIONAL XFMR/Equiv.	1
P-76	22-05-2101		• Right Angle Connector MOLEX/Equiv.	1
P-77 & 78	22-05-2181		• Right Angle Connector	2

9.6 Flexible RF CABLE Assemblies

Dwg. and Ref. Symbol	Part No.	IFR Stock No.	Description	Qty. Per Assy.
4-25-108		1-25-244	Flexible Coax. Assys.	REF.
J-19 to J-79, J-46 to J-50		3-25-044-3	• Flex. Cable Assy.	2
J-20 to J-67		3-25-044-4	• Flex. Cable Assy.	1
J-21 to J-1-8		3-25-044-10	• Flex. Cable Assy.	1
J-22 to J-57		3-25-044-9	• Flex. Cable Assy.	1
J-40 to J-59		3-25-044-6	• Flex. Cable Assy.	1
J-44 to J-4-6 J-45 to J-48		3-25-044-8	• Flex. Cable Assy.	2
J-51 to J-8-10		3-25-044-11	• Flex. Cable Assy.	1
J-56 to J-81		3-25-044-7	• Flex. Cable Assy.	1
J-58 to J-70		3-25-044-5	• Flex. Cable Assy.	1
(VCO Module)		3-25-044-1	• Flex. Cable Assy.	2
(VCO Module)		3-25-044-2	• Flex. Cable Assy.	1

Materials used in the construction of the Flexible RF Cable Assemblies are as follows:

Connectors	P/N	Qty.
AMERICON	2001-7188	5
	2004-7188	2
	2007-7188	5
	5137-7188-09	6
OSM	531-5	1
AMPHENOL	27-7	2
CABLEWAVE SYSTEMS	700235	4
Flexible RF Cable		
BELDEN	RG-188/U	A/R
	RG-178 B/U	A/R

9.7 Semi-Rigid Coax. Cable Assemblies

Dwg. and Ref. Symbol	Part No.	IFR Stock No.	Description	Qty. Per Assy.
4-25-108		1-25-045	Semi-Rigid Coax. Cable Assys.	REF.
J-15 to J-61		1-25-215	• Cable Assy.	1
J-16 to J-62		1-25-216	• Cable Assy.	1
J-17 to J-53		1-25-212	• Cable Assy.	1
J-18 to J-43		1-25-234	• Cable Assy.	1
J-23 to J-71		1-25-226	• Cable Assy.	1
J-24 to J-68		1-25-228	• Cable Assy.	1
J-25 to J-72		1-25-232	• Cable Assy.	1
J-26 to J-30		1-25-231	• Cable Assy.	1
J-27 to J-63		1-25-223	• Cable Assy.	1
J-28 to J-29		1-25-230	• Cable Assy.	1
J-31 to J-32		1-25-227	• Cable Assy.	1
J-33 to J-69		1-25-224	• Cable Assy.	1
J-34 to J-35		1-25-229	• Cable Assy.	1
J-36 to J-37		1-25-210	• Cable Assy.	1
J-38 to J-39		1-25-221	• Cable Assy.	1
J-41 to J-47		1-25-222	• Cable Assy.	1
J-42 to J-60		1-25-220	• Cable Assy.	1
J-48 to J-54		1-25-213	• Cable Assy.	1
J-49 to J-55		1-25-236	• Cable Assy.	1
(VCO Module)		1-25-041	• Cable Assy.	1
(VCO Module)		1-25-042	• Cable Assy.	1
(VCO Module)		1-25-043	• Cable Assy.	1

PARTS LIST

Dwg. and Ref. Symbol	Part No.	IFR Stock No.	Description	Qty. Per Assy.
(VCO Module)		1-25-203	• Cable Assy.	1

Materials used in the construction of the Semi-Rigid Coax. Cable Assemblies are as follows.

Connectors	P/N	Qty.
AMERICON	2001-5009	25
	2001-7941	8
	3004-7941	3
	2007-7941	
TED	4-10-98	4
	4-10-93	2
CABLEWAVE SYSTEMS	529001	2
Semi-Rigid Coax. Cable		
TIMES WIRE CO.	CL-50-086	A/R
	CL-50-141	A/R

9.8 Covers and Miscellaneous Hardware

Dwg. and Ref. Symbol	Part No.	IFR Stock No.	Description	Qty. Per Assy.
		4-76-275	Side Frame	2
		1-76-307	• Side frame Handle trim	2
		3-76-121	• Side Cover	2
		1-76-070	• Trim Strip	2
		2-76-324	• Handle Assy.	2
		2-76-067	• • Handle	1
		1-76-291	• • Handle return spring	1
		1-76-309	• • Handle trim	1
		3-76-066	Bottom Cover	1
		3-76-065	Top Cover	1
		2-76-302	Foot Assy.	5
		1-76-068	• Foot	1
		1-76-297	• Button	1
		1-76-301	• Spring	1
		1-76-298	• Washer	1

9.9 Shipping Crate Contents

Dwg. and Ref. Symbol	Part No.	IFR Stock No.	Description	Qty. Per Assy.
		3-00-168	RD-300 Shipping crate	REF.
		1-25-197	• RD-300 Radar Test Set	1
		1-25-023	• RD-300 Product Manual	1
	17460-S		• Line power cable, BELDEN/Equiv.	1
	165-26		• Connector, AMPHENOL/Equiv.	1

NOTE

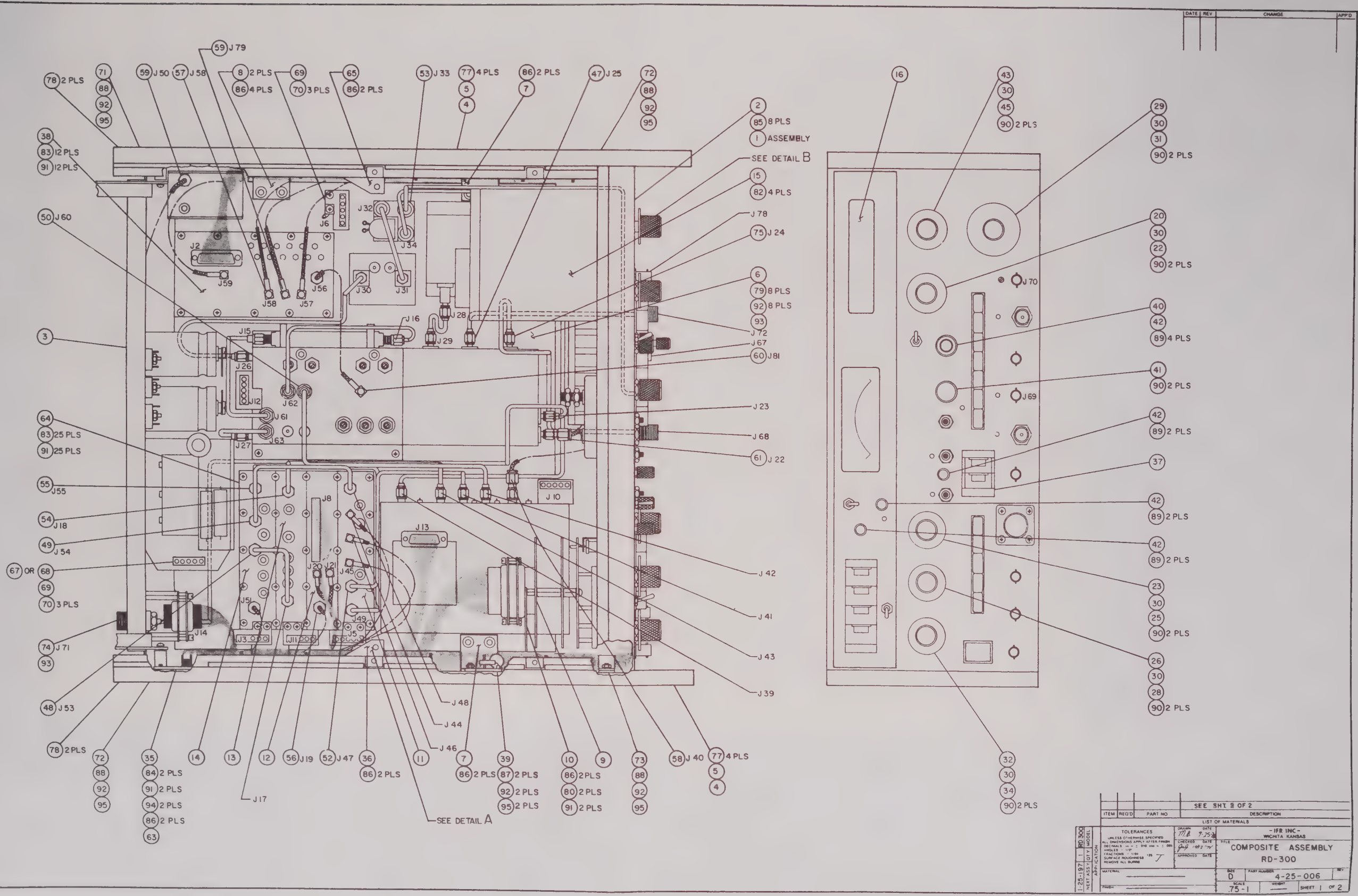
The following items are used in the final calibration of the Test Set and therefore are matched to the Test Set. Serialization of these items helps to ensure use with the appropriate Test Set.

		1-25-254	• Coaxial Cable, HP/Equiv. 1
		2-76-236	• Waveguide Coupler SYSTRON-DONNER/Equiv. 1
		2-76-235	• Waveguide Termination, SYSTRON-DONNER/Equiv. 1
	DBG-1020		• • Coupling Hardware SYSTRON-DONNER/Equiv. 4

Table 9-1

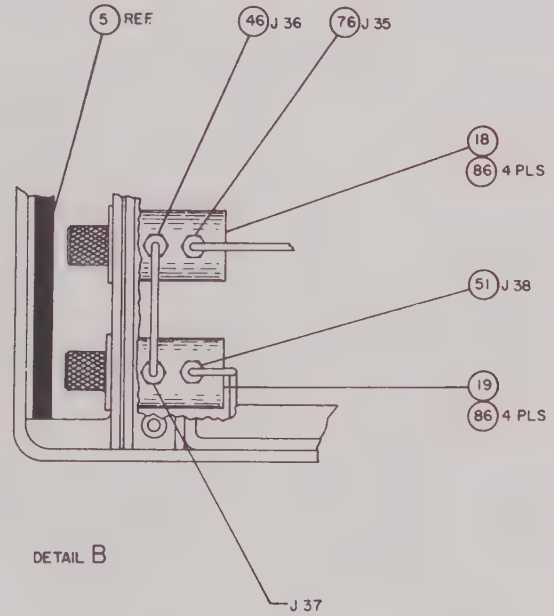
RD-300 RADAR Bench Test Set Spare Parts Recommendation (one year level).

LED	Qty.
5082-4684	3
Transistors	
2N3646	1
2N3251	1
2N2222	1
40321	1
IC	
SN7490	1
CD4066	1
CD4029	1
CD4049	1
LM377	1
AD7520	1
CA3130	1
SN74121	1

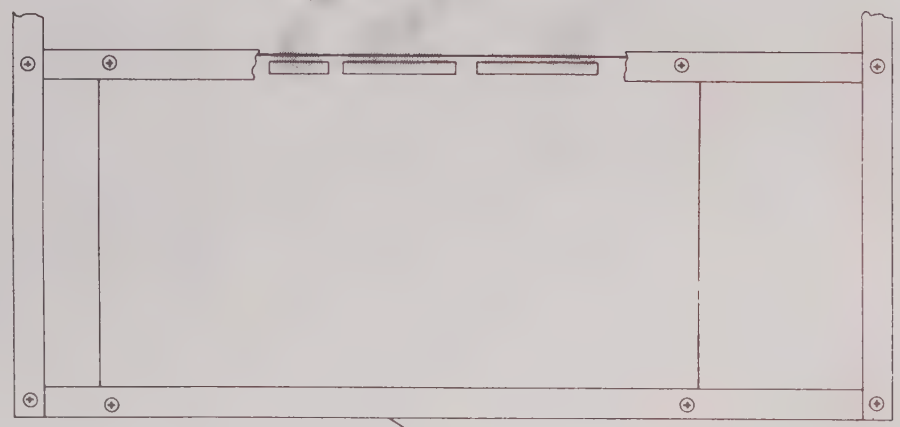


SEE DETAIL B
SEE DETAIL A
SEE SHT 2 OF 2
LIST OF MATERIALS
TOLERANCES
- IFR INC -
WICHITA KANSAS
COMPOSITE ASSEMBLY
RD-300
4-25-006
SHEET 1 OF 2

Fig. 10-1-1



DETAIL B



DETAIL A

DATE	REV	CHANGE	APP'D

95	6	6-32	SMALL PATTERN HEX NUT	48	1	2-25-212	IF OSC, IF GEN, POWER AMP
94	2	4-40	LARGE PATTERN HEX NUT	47	1	3-25-232	FRONT PANEL, X-BAND FRONTEND
93	2	2-76-002-14	FLAT WASHER	46	1	1-25-210	SEMI-RIGID COAX ASSY 0-12,0-100 dB ATTEN
92	14	#6	INT TOOTH LOCKWASHER	45	1	2-25-261	"10 dB" STEPPED ATTENUATOR DIAL
91	43	#4	INT TOOTH LOCKWASHER	43	1	2-25-263	"10dB" STEPPED ATTENUATOR DIAL ASSY
90	14	4-40x1/8	SOCKET SCREW " " "	42	4	1-09-219-1	KNOB, "ΔF, AUX RANGE, ANT RATE, MAN FREQ"
89	10	2-56x1/8	SOCKET SCREW, SOCKET HD SET SCREW	41	1	1-00-057-3	KNOB, "MKR FREQ"
88	4	6-32x3/8	PFHMS	40	1	1-09-220	KNOB, "MAN FREQ"
87	2	6-32x5/16	PFHMS	39	1	1-25-247	WIRE HARNESS COMPONENT INTERCONNECT BD ASSY
86	26	6-32x1/4	PFHMS	38	1	1-25-242	30 MHZ DISCRIMINATOR ASSY
85	8	8-32x1/4	PFHMS	37	1	1-25-152	ANTENNA ANGLE SELECT SWITCH ASSY
84	2	4-40x1/2	PBHMS	36	1	1-25-049-1	MTG.BRKT. SYNCHRO SIMULATOR ASSY.
83	37	4-40x3/8	PBHMS	35	1	1-25-202	TERMINAL BLOCK MTG PLATE
82	4	4-40x5/16	PBHMS (BLACK OXIDE)	34	1	1-25-158	PRF DIAL
81	2	4-40x1/4	PBHMS				
80	2	4-40x1/8	PBHMS	32	1	2-25-238	PRF DIAL ASSY
79	8	6-32x5/16	PBHMS	31	1	2-25-262	"1 dB" STEPPED ATTENUATOR DIAL
78	4	8-32x1/4	PBHMS	30	1	2-00-158	KNOB
77	8	CII351-632	"TINNERMAN" EQUIV SPEEDNUT	29	1	2-25-264	"1 dB" STEPPED ATTENUATOR DIAL ASSY
76	1	2-25-229	IF/RF RELAY, 0-12 dB ATTENUATOR	28	1	1-25-009	"WIDTH DIAL"
75	1	3-25-228	FRONT PANEL, X BAND FRONTEND				
74	1	3-25-226	SEMI RIGID COAX ASSY-REAR PANEL, X BAND FRONTEND	26	1	2-25-010	"WIDTH DIAL ASSY"
73	1	837		25	1	1-25-011	"SWEEP WIDTH" DIAL
72	2	835					
71	1	833	"GC ELECTRONICS" EQUIV CABLE CLAMP	23	1	2-25-012	"SWEEP WIDTH" DIAL ASSY
70	8	02-06-2132	"MOLEX" EQUIV. CRIMP TERMINAL	22	1	1-25-013	"CONTOUR" DIAL
69	2	03-06-2055	"MOLEX" EQUIV. CONN.				
68	1	1-25-253-1	PLUG ASSY (110 V)	20	1	2-25-014	"CONTOUR" DIAL ASSY
67	1	1-25-253-2	PLUG ASSY (220 V)	19	1	2-76-331	"WEINSCHEL" EQUIV 0-100 dB STEPPED ATTENUATOR
(NOT SHOWN) 66	1	2-76-236	"SYSTRON DONNER" EQUIV WAVE GUIDE COUPLER	18	1	2-76-332	"WEINSCHEL" EQUIV 0-10 dB STEPPED ATTENUATOR
65	1	1-25-049-2	MTG. BRKT. SYNCHRO SIMULATOR ASSY.	17	1	1-25-167	SERVO CONTROL BD ASSY
64	1	2-25-161	RF GASKET	16	1	1-25-211	LENS
63	1	1411-4	"HH SMITH" EQUIV INT TOOTH GROUND LUG	15	1	1-25-177	COUNTER ASSY
(NOT SHOWN) 62	1	1-25-254	ACCESSORY CABLE ASSY	14	1	1-25-175	IF & MARKER OSCILLATOR P.C. BD ASSY
61	1	3-25-044-9	X BAND FRONTEND, 30MHZ DISC	13	1	1-25-173	IF GEN POWER AMP P.C. BD ASSY
60	1	3-25-044-7	SSB MODULE, 30 MHZ DISC	12	1	1-25-174	AUXILIARY P.C. BD ASSY
59	2	3-25-044-3	90 MHZ OSC, PRESCALER; AUX, 30 MHz DISC.	11	1	1-25-176	MARKER PRESCALER P.C. BOARD ASSY
58	1	3-25-044-6	VCO MODULE, 30 MHZ DISC	10	1	3-25-249	STABLIZER BRACKET
57	1	3-25-044-5	FRONT PANEL, 30 MHZ DISC	9	1	1-25-169	RANGE CONTOUR ASSY
56	1	3-25-044-4	FLEX RF CABLE ASSY-FRONT PANEL, AUXILARY BD.	8	2	2-14-242-2	FLOOR MOUNTING FOOT
55	1	2-25-236	IF OSC, PRESCALER	7	2	2-14-242-1	FLOOR MOUNTING FOOT
54	1	2-25-234	VCO MODULE, IF AMP	6	1	1-25-192	FLOOR ASSY
53	1	2-25-224	IF/RF RELAY, FRONT PANEL	5	2	1-76-307	SIDE FRAME HANDLE TRIM
52	1	3-25-222	VCO MODULE, PRESCALER	4	2	4-76-275	SIDE FRAME
51	1	2-25-221	VCO MODULE, 0-100 dB ATTENUATOR	3	1	1-25-190	REAR PANEL ASSY
50	1	2-25-220	VCO, SSB MODULE	2	1	1-25-168	FRONT PANEL ASSY
49	1	2-25-213	SEMI-RIGID COAX ASSY-IF OSC, PRESCALER	1	1	1-25-006	COMPOSITE ASSY
ITEM	REQ'D	PART NO.	DISCRIPTION	ITEM	REQ'D	PART NO	DESCRIPTION

LIST OF MATERIALS (CONT.) — LIST OF MATERIALS

RD-300	TOLERANCES UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH DECIMALS .xx ± .010 .xxx ± .005 ANGLES ± 1° FRACTIONS ± 1/64 SURFACE ROUGHNESS 125 REMOVE ALL BURRS	DRAWN M.B 9-25-78	- IFR INC - WICHITA, KANSAS		
1-25-197		CHECKED DATE	TITLE COMPOSITE ASSEMBLY RD-300		
NEXT ASSY		APPROVED DATE			
APPLICATION	MATERIAL		SIZE D	PART NUMBER 4-25-006	REV
	FINISH		SCALE .75-1	WEIGHT	SHEET 2 OF 2

Fig. 10-1-2

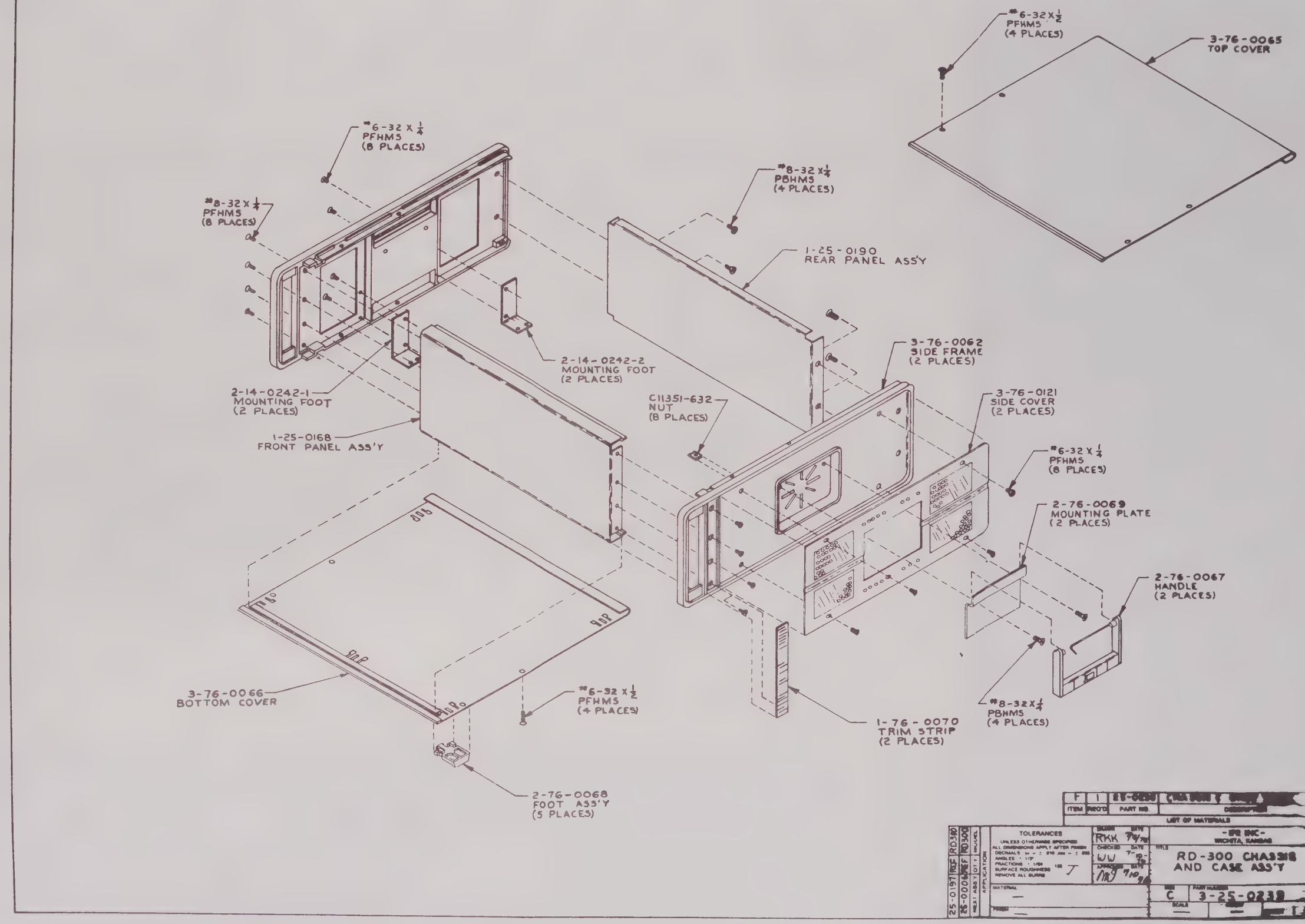
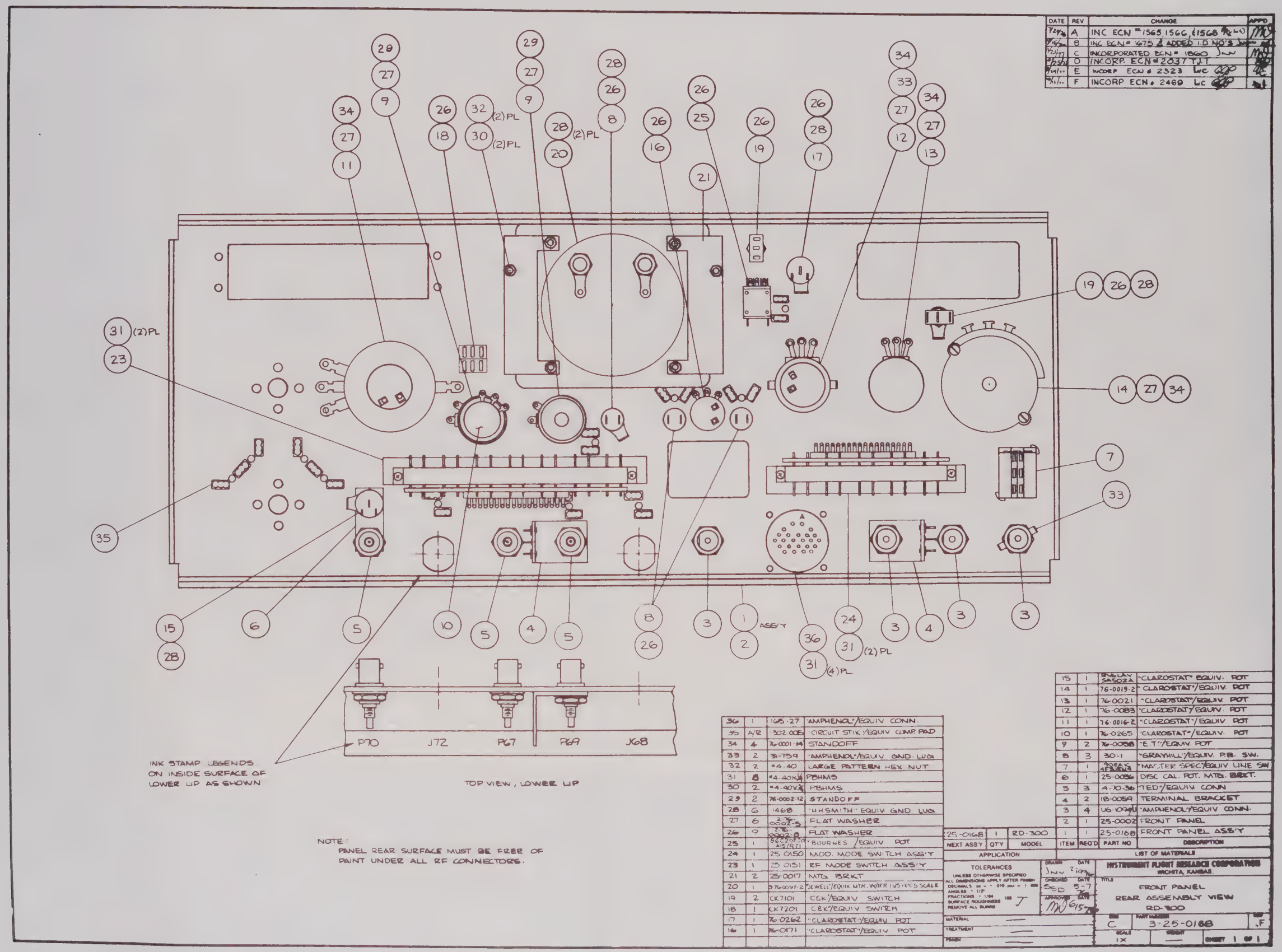

*6-32 X 1/2 PFHMS (4 PLACES)
3-76-0065 TOP COVER
*6-32 X 1/4 PFHMS (8 PLACES)
*8-32 X 1/4 PBHMS (4 PLACES)
*8-32 X 1/4 PFHMS (8 PLACES)
1-25-0190 REAR PANEL ASS'Y
2-14-0242-2 MOUNTING FOOT (2 PLACES)
3-76-0062 SIDE FRAME (2 PLACES)
2-14-0242-1 MOUNTING FOOT (2 PLACES)
C11351-632 NUT (8 PLACES)
3-76-0121 SIDE COVER (2 PLACES)
1-25-0168 FRONT PANEL ASS'Y
*6-32 X 1/4 PFHMS (8 PLACES)
2-76-0069 MOUNTING PLATE (2 PLACES)
2-76-0067 HANDLE (2 PLACES)
3-76-0066 BOTTOM COVER
*6-32 X 1/2 PFHMS (4 PLACES)
*8-32 X 1/4 PBHMS (4 PLACES)
1-76-0070 TRIM STRIP (2 PLACES)
2-76-0068 FOOT ASS'Y (5 PLACES)
RD-300 CHASSIS AND CASE ASS'Y
3-25-0238

Fig. 10-2



DATE | REV | CHANGE | APPD
A | INC ECN #1565, 1566, & 1568
B | INC ECN # 1675 & ADDED I.D. NO'S
C | INCORPORATED ECN # 1860
D | INCORP. ECN # 2037 TJ.T
E | INCORP ECN # 2323 LWC
F | INCORP ECN # 2469 LWC
INK STAMP LEGENDS ON INSIDE SURFACE OF LOWER LIP AS SHOWN
TOP VIEW, LOWER LIP
P70
J72
P67
P69
J68
NOTE:
PANEL REAR SURFACE MUST BE FREE OF PAINT UNDER ALL RF CONNECTORS.
36 | 1 | 165-27 | "AMPHENOL"/EQUIV CONN.
35 | A/R | 1302.005 | "CIRCUIT STIK"/EQUIV COMP. PAD
34 | 4 | 76-0001-14 | STANDOFF
33 | 2 | 31-759 | "AMPHENOL"/EQUIV GND. LUG
32 | 2 | #4-40 | LARGE PATTERN HEX NUT
31 | 8 | #4-40X1/4 | PBHMS
30 | 2 | #4-40X3/4 | PBHMS
29 | 2 | 76-0002-12 | STANDOFF
28 | 6 | 1468 | "HHSMITH" EQUIV. GND LUG
27 | 6 | 2-76-0002-5 | FLAT WASHER
26 | 9 | 2-76-0002-8 | FLAT WASHER
25 | 1 | 86C20E20 A15/R71 | "BOURNES"/EQUIV POT
24 | 1 | 25-0150 | MOD. MODE SWITCH ASS'Y
23 | 1 | 25-0151 | RF MODE SWITCH ASS'Y
21 | 2 | 25-0017 | MTG BRKT
20 | 1 | 5-76-0097-2 | "JEWELL"/EQUIV. MTR. W/IFR 1-25-0005 SCALE
19 | 2 | CK7101 | "CEK"/EQUIV SWITCH
18 | 1 | CK7201 | "CEK"/EQUIV SWITCH
17 | 1 | 76-0262 | "CLAROSTAT"/EQUIV POT
16 | 1 | 76-0171 | "CLAROSTAT"/EQUIV POT
15 | 1 | ENGLAY SA502A | "CLAROSTAT" EQUIV. POT
14 | 1 | 76-0019-2 | "CLAROSTAT"/EQUIV. POT
13 | 1 | 76-0021 | "CLAROSTAT"/EQUIV. POT
12 | 1 | 76-0083 | "CLAROSTAT"/EQUIV. POT
11 | 1 | 76-0016-2 | "CLAROSTAT"/EQUIV POT
10 | 1 | 76-0265 | "CLAROSTAT"/EQUIV. POT
9 | 2 | 76-0058 | "E.T."/EQUIV. POT
8 | 3 | 30-1 | "GRAYHILL"/EQUIV. P.B. SW.
7 | 1 | 90EAC 4F3UNA | "MASTER SPEC"/EQUIV LINE SW
6 | 1 | 25-0056 | DISC CAL. POT. MTG. BRKT.
5 | 3 | 4-70-36 | "TED"/EQUIV CONN
4 | 2 | 18-0059 | TERMINAL BRACKET
3 | 4 | UG-1094/U | "AMPHENOL"/EQUIV CONN.
2 | 1 | 25-0002 | FRONT PANEL
1 | 1 | 25-0168 | FRONT PANEL ASS'Y
ITEM | REQ'D | PART NO | DESCRIPTION
LIST OF MATERIALS
25-0168 | 1 | RD-300
NEXT ASS'Y | QTY | MODEL
APPLICATION
TOLERANCES
UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS .XX = ± .010 .XXX = ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS
MATERIAL
TREATMENT
FINISH
DRAWN JNV 2-19-76
CHECKED SSD 5-7-76
APPROVED MW 6-15-76
INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS.
TITLE
FRONT PANEL
REAR ASSEMBLY VIEW
RD-300
SIZE C
PART NUMBER 3-25-0168
REV .F
SCALE 1X
WEIGHT
SHEET 1 OF 1

Fig. 10-3

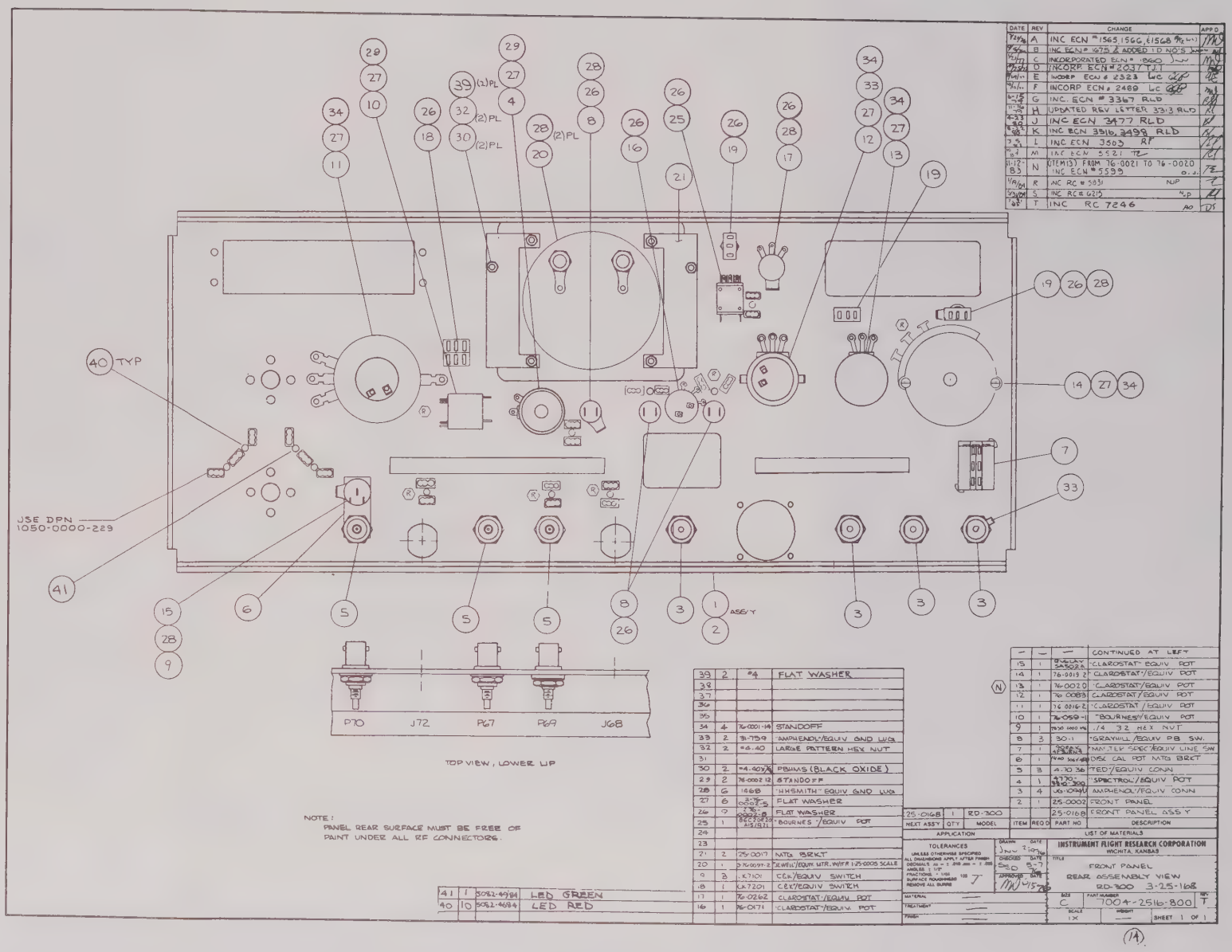
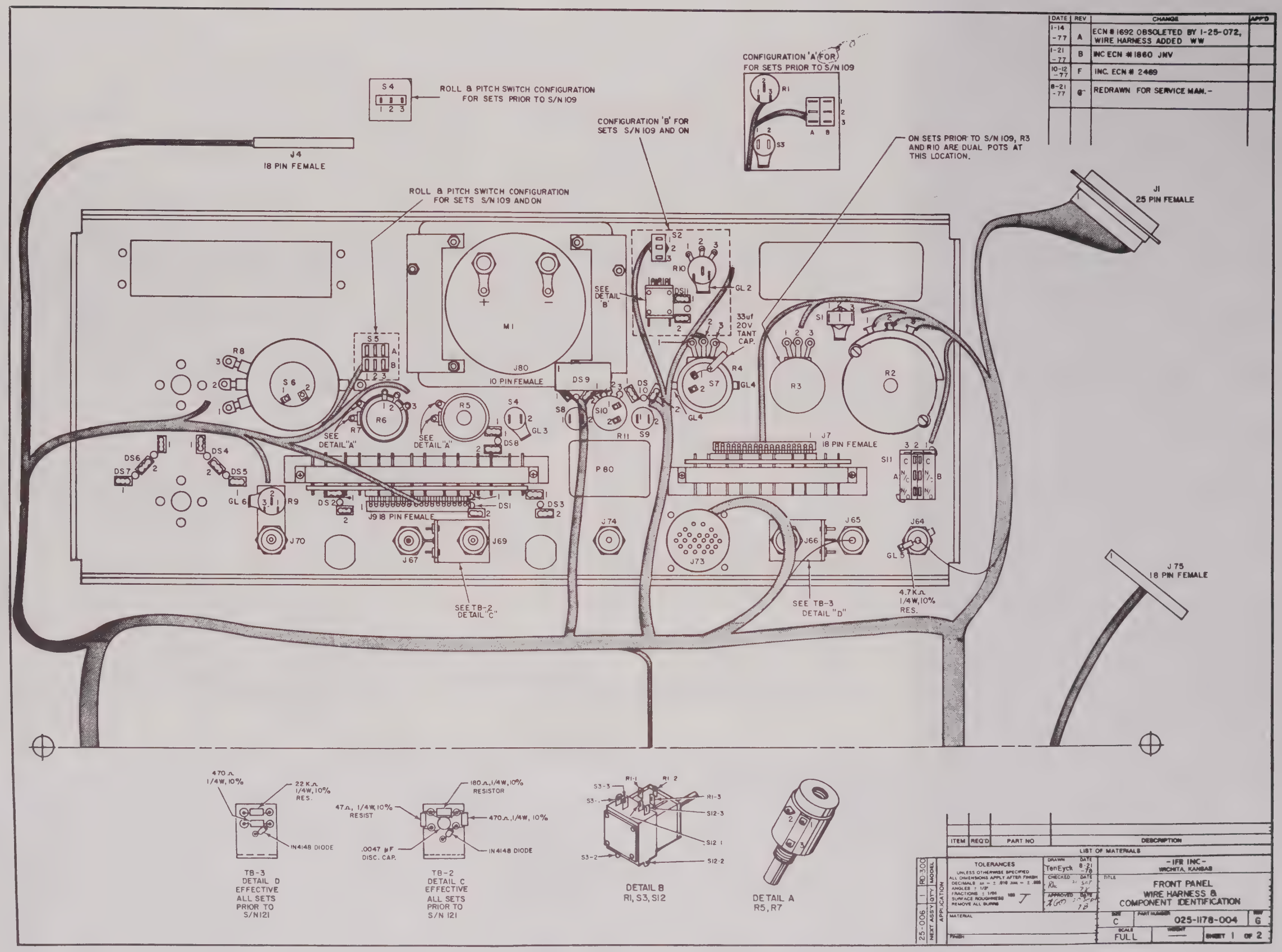
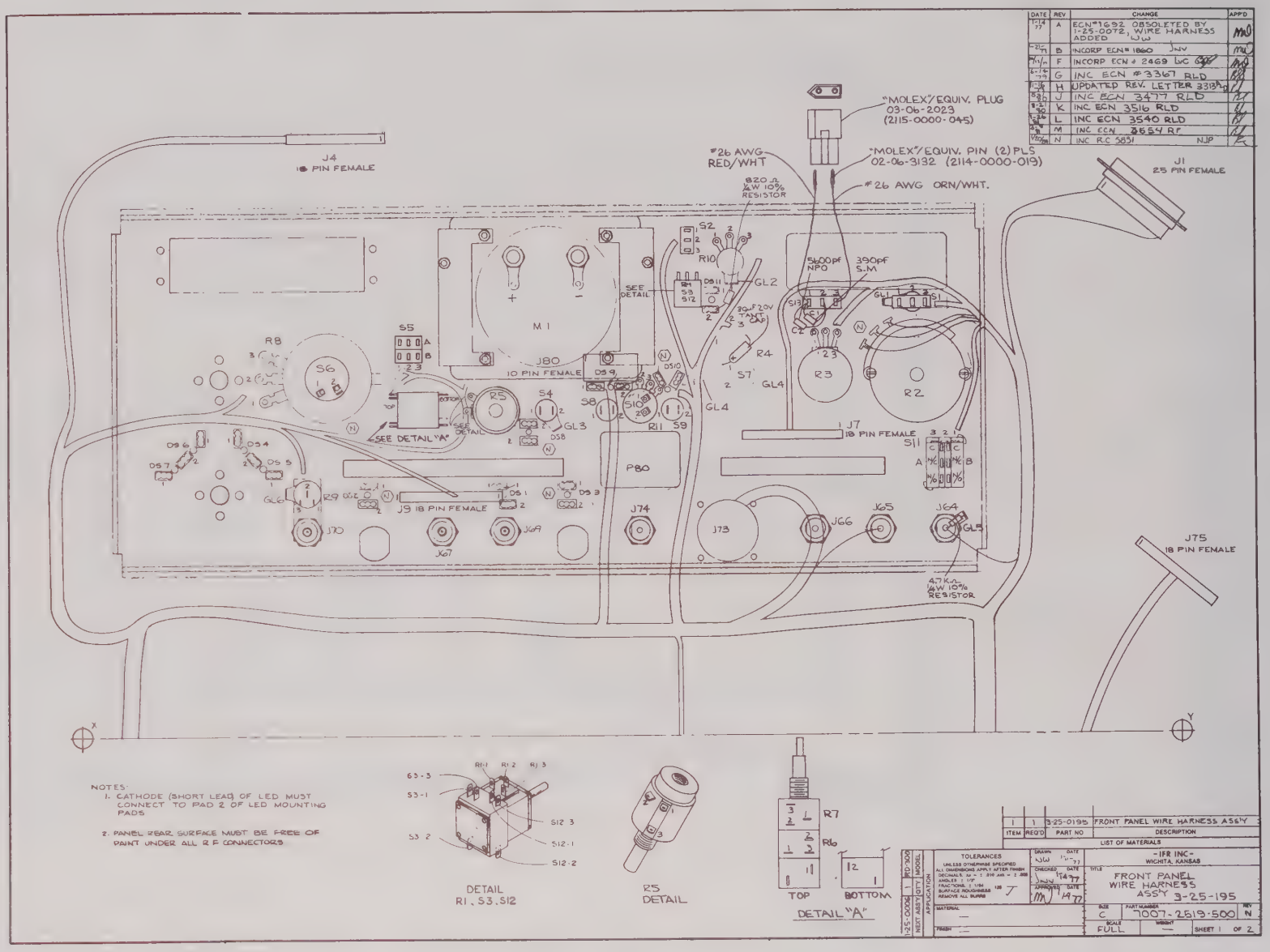

JSE DPN 1050-0000-229
TOP VIEW, LOWER LIP
P70 J72 P67 P69 J68
NOTE: PANEL REAR SURFACE MUST BE FREE OF PAINT UNDER ALL RF CONNECTORS.
INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS
FRONT PANEL
REAR ASSEMBLY VIEW
RD-300 3-25-168
7004-2516-800

Fig. 10-3-1



DATE | REV | CHANGE | APP'D
1-14-77 | A | ECN # 1692 OBSOLETED BY 1-25-072, WIRE HARNESS ADDED WW
1-21-77 | B | INC ECN # 1860 JNV
10-12-77 | F | INC. ECN # 2469
8-21-77 | G | REDRAWN FOR SERVICE MAN.-
CONFIGURATION 'A' FOR FOR SETS PRIOR TO S/N 109
ROLL & PITCH SWITCH CONFIGURATION FOR SETS PRIOR TO S/N 109
CONFIGURATION 'B' FOR SETS S/N 109 AND ON
ON SETS PRIOR TO S/N 109, R3 AND R10 ARE DUAL POTS AT THIS LOCATION.
J4 18 PIN FEMALE
J1 25 PIN FEMALE
ROLL & PITCH SWITCH CONFIGURATION FOR SETS S/N 109 AND ON
J80 10 PIN FEMALE
J7 18 PIN FEMALE
J9 18 PIN FEMALE
J75 18 PIN FEMALE
SEE DETAIL 'B'
SEE DETAIL "A"
SEE TB-2 DETAIL "C"
SEE TB-3 DETAIL "D"
33uf 20V TANT CAP.
4.7KΩ 1/4W, 10% RES.
470Ω 1/4W, 10%
22KΩ 1/4W, 10% RES.
IN4148 DIODE
TB-3 DETAIL D EFFECTIVE ALL SETS PRIOR TO S/N121
180Ω, 1/4W, 10% RESISTOR
47Ω, 1/4W, 10% RESIST
470Ω, 1/4W, 10%
.0047 μF DISC. CAP.
IN4148 DIODE
TB-2 DETAIL C EFFECTIVE ALL SETS PRIOR TO S/N 121
DETAIL B R1, S3, S12
DETAIL A R5, R7
ITEM | REQ'D | PART NO | DESCRIPTION
LIST OF MATERIALS
TOLERANCES
UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH
DRAWN TenEyck DATE 8-21-78
CHECKED DATE
APPROVED DATE
-IFR INC- WICHITA, KANSAS
TITLE FRONT PANEL WIRE HARNESS & COMPONENT IDENTIFICATION
SIZE C
PART NUMBER 025-1178-004
REV G
SCALE FULL
SHEET 1 OF 2
25-006 | 1 | RD-300
NEXT ASSY | QTY | MODEL
APPLICATION
MATERIAL
FINISH

Fig. 10-4



J4
18 PIN FEMALE
J1
25 PIN FEMALE
J75
18 PIN FEMALE
J80
10 PIN FEMALE
J9 18 PIN FEMALE
J7
18 PIN FEMALE
"MOLEX"/EQUIV. PLUG
03-06-2023
(2115-0000-045)
"MOLEX"/EQUIV. PIN (2) PLS
02-06-3132 (2114-0000-019)
#26 AWG
RED/WHT
#26 AWG ORN/WHT.
820 Ω
¼W 10%
RESISTOR
5600pf
NPO
390pf
S.M
4.7KΩ
¼W 10%
RESISTOR
SEE DETAIL "A"
NOTES:
1. CATHODE (SHORT LEAD) OF LED MUST CONNECT TO PAD 2 OF LED MOUNTING PADS
2. PANEL REAR SURFACE MUST BE FREE OF PAINT UNDER ALL R F CONNECTORS
DETAIL
R1, S3, S12
R5
DETAIL
TOP
BOTTOM
DETAIL "A"
FRONT PANEL WIRE HARNESS ASS'Y
3-25-0195
LIST OF MATERIALS
-IFR INC-
WICHITA, KANSAS
FRONT PANEL
WIRE HARNESS
ASS'Y 3-25-195
7007-2519-500
FULL
SHEET 1 OF 2

Fig. 10-4-1

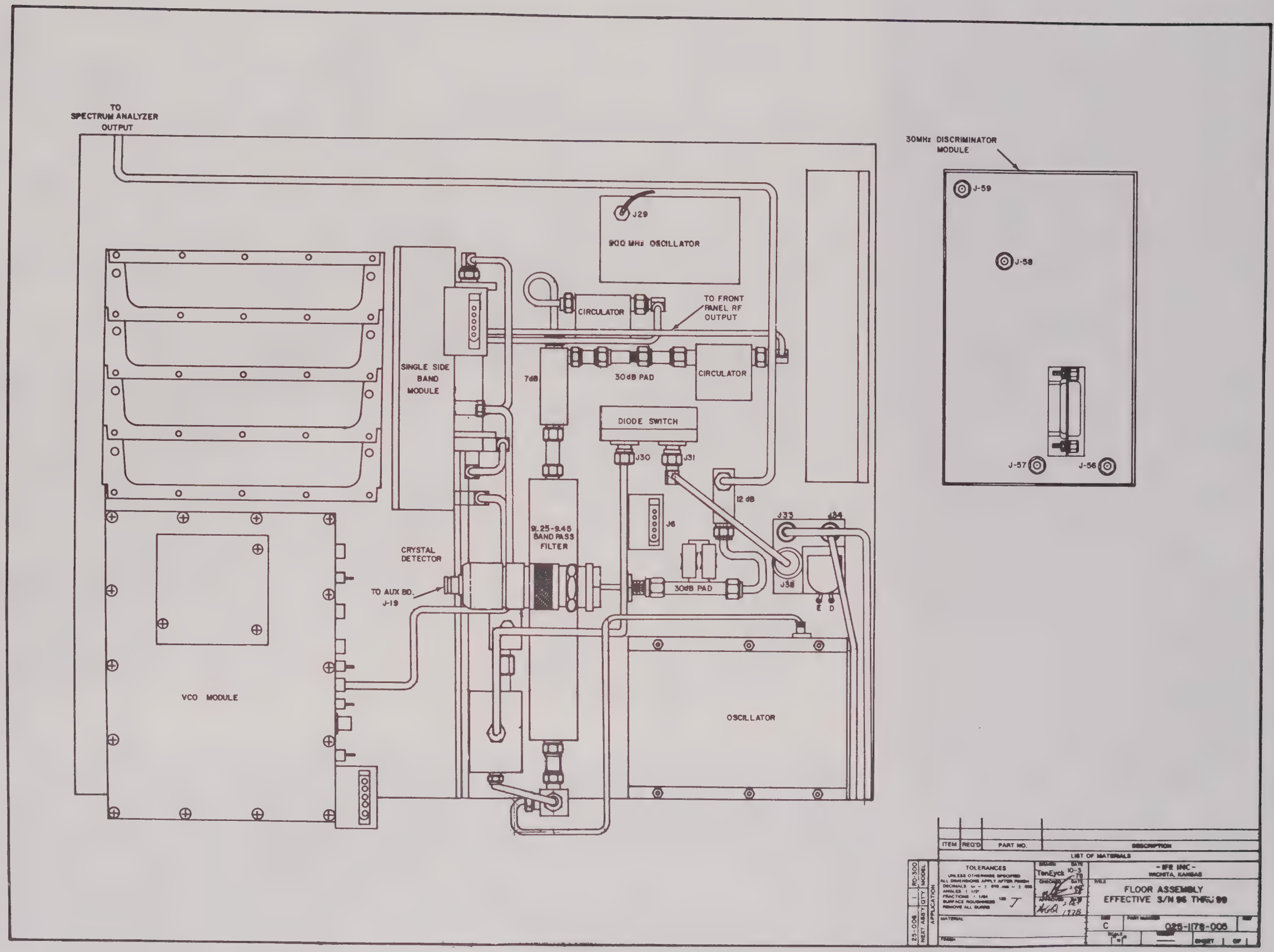
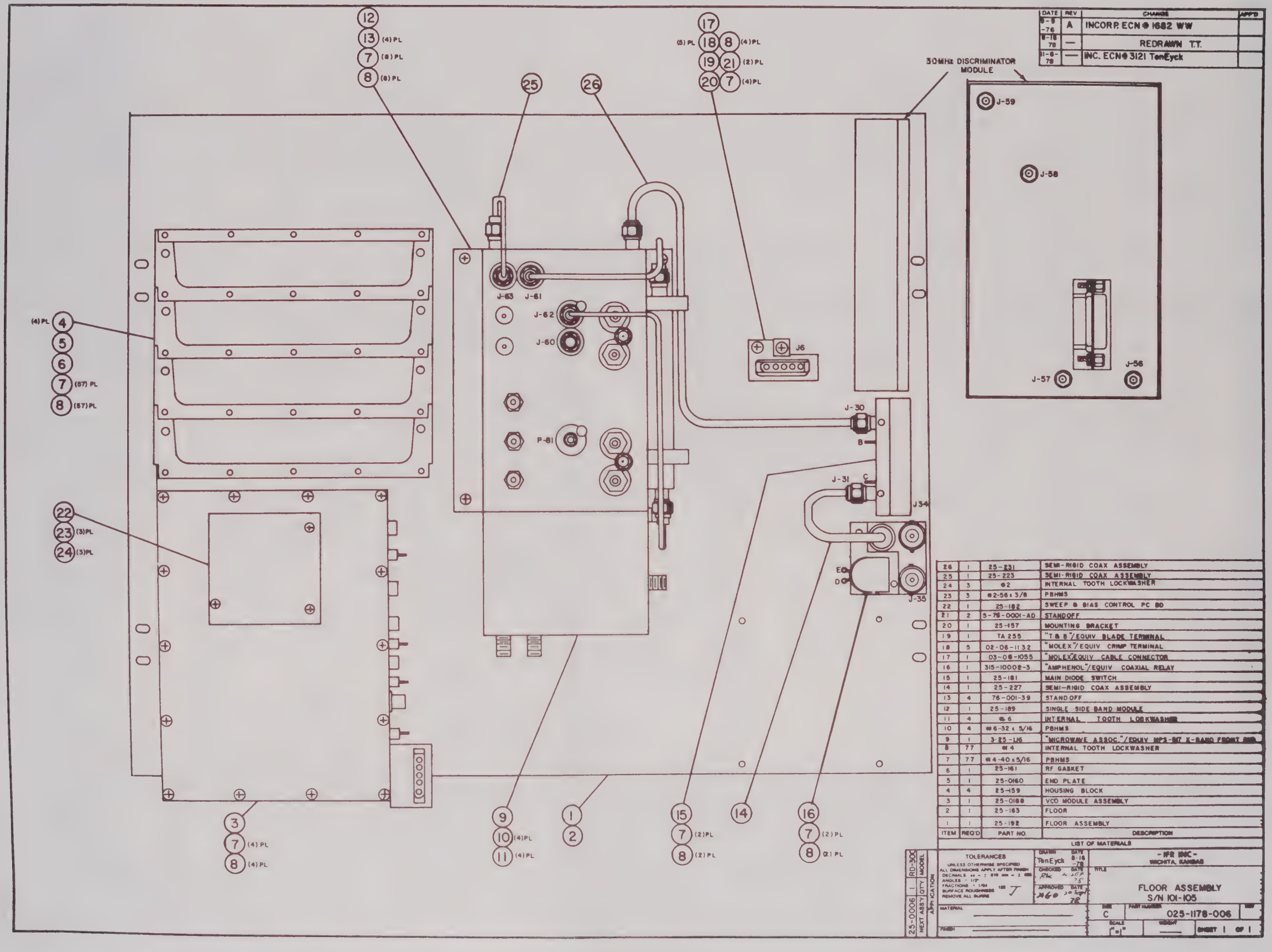

TO SPECTRUM ANALYZER OUTPUT
30MHz DISCRIMINATOR MODULE
J-59
J-58
J-57
J-56
J29
900 MHz OSCILLATOR
CIRCULATOR
TO FRONT PANEL RF OUTPUT
SINGLE SIDE BAND MODULE
7dB
30dB PAD
CIRCULATOR
DIODE SWITCH
J30
J31
12 dB
J6
J33
J34
J32
E
D
9.25-9.45 BAND PASS FILTER
CRYSTAL DETECTOR
TO AUX BD. J-19
30dB PAD
VCO MODULE
OSCILLATOR
ITEM
REQ'D
PART NO.
DESCRIPTION
LIST OF MATERIALS
TOLERANCES
TenEyck
10-3-78
- IFR INC -
WICHITA, KANSAS
FLOOR ASSEMBLY
EFFECTIVE S/N 96 THRU 99
C
025-1178-005
25-006
NEXT ASSY
QTY
APPLICATION
RD-300
MODEL

Fig. 10-5-1



ITEM	REQ'D	PART NO.	DESCRIPTION
26	1	25-231	SEMI-RIGID COAX ASSEMBLY
25	1	25-223	SEMI-RIGID COAX ASSEMBLY
24	3	#2	INTERNAL TOOTH LOCKWASHER
23	3	#2-56 x 3/8	PBHMS
22	1	25-182	SWEEP & BIAS CONTROL PC BD
21	2	5-76-0001-AD	STANDOFF
20	1	25-157	MOUNTING BRACKET
19	1	TA 255	"T & B"/EQUIV BLADE TERMINAL
18	5	02-06-1132	"MOLEX"/EQUIV CRIMP TERMINAL
17	1	03-08-1055	"MOLEX"/EQUIV CABLE CONNECTOR
16	1	315-10002-3	"AMPHENOL"/EQUIV COAXIAL RELAY
15	1	25-181	MAIN DIODE SWITCH
14	1	25-227	SEMI-RIGID COAX ASSEMBLY
13	4	76-001-39	STAND OFF
12	1	25-189	SINGLE SIDE BAND MODULE
11	4	#6	INTERNAL TOOTH LOCKWASHER
10	4	#6-32 x 5/16	PBHMS
9	1	3-25-116	"MICROWAVE ASSOC."/EQUIV MPS-817 X-BAND FRONT END
8	77	#4	INTERNAL TOOTH LOCKWASHER
7	77	#4-40 x 5/16	PBHMS
6	1	25-161	RF GASKET
5	1	25-0160	END PLATE
4	4	25-159	HOUSING BLOCK
3	1	25-0188	VCO MODULE ASSEMBLY
2	1	25-163	FLOOR
1	1	25-192	FLOOR ASSEMBLY

LIST OF MATERIALS

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS ±.010 mm = ±.005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS

DRAWN TenEyck DATE 8-16-78
CHECKED RK DATE 8-16-78
APPROVED MGO DATE 20 Sept 78

MATERIAL
FINISH

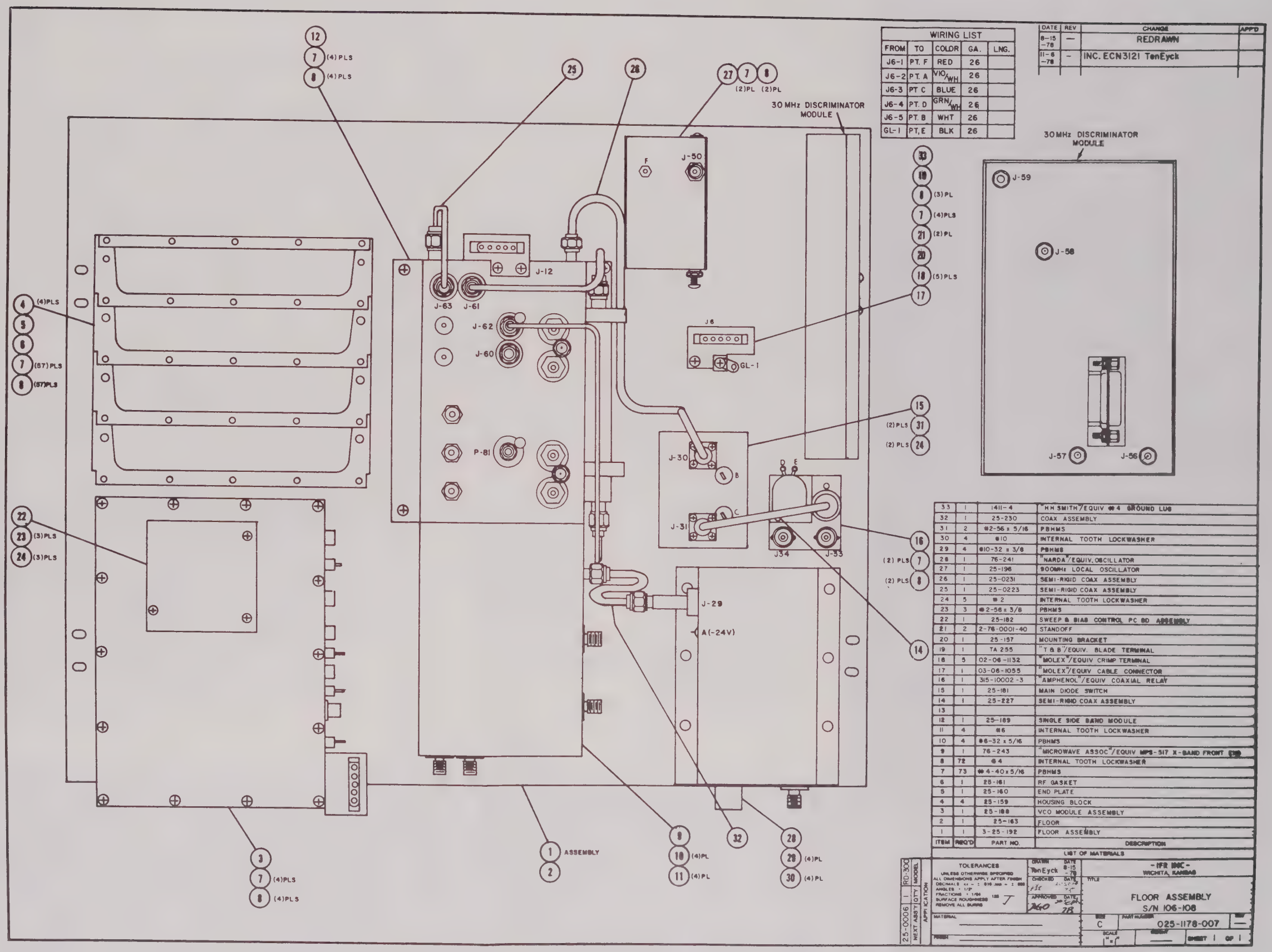
- IFR INC -
WICHITA, KANSAS

TITLE
FLOOR ASSEMBLY
S/N 101-105

SIZE C | PART NUMBER 025-1178-006 | REV
SCALE 1" = 1" | WEIGHT | SHEET 1 OF 1

25-0006 | 1 | RD-300
NEXT ASSY | QTY | MODEL
APPLICATION

Fig. 10-5-2



WIRING LIST				
FROM	TO	COLOR	GA.	LNG.
J6-1	PT. F	RED	26	
J6-2	PT. A	VIO/WH	26	
J6-3	PT C	BLUE	26	
J6-4	PT. D	GRN/WH	26	
J6-5	PT. B	WHT	26	
GL-1	PT, E	BLK	26	

DATE	REV	CHANGE	APP'D
8-15-78	—	REDRAWN	
11-6-78	-	INC. ECN3121 TenEyck	

ITEM	REQ'D	PART NO.	DESCRIPTION
33	1	1411-4	"H H SMITH"/EQUIV #4 GROUND LUG
32	1	25-230	COAX ASSEMBLY
31	2	#2-56 x 5/16	PBHMS
30	4	#10	INTERNAL TOOTH LOCKWASHER
29	4	#10-32 x 3/8	PBHMS
28	1	76-241	"NARDA"/EQUIV. OSCILLATOR
27	1	25-196	900MHz LOCAL OSCILLATOR
26	1	25-0231	SEMI-RIGID COAX ASSEMBLY
25	1	25-0223	SEMI-RIGID COAX ASSEMBLY
24	5	#2	INTERNAL TOOTH LOCKWASHER
23	3	#2-56 x 3/8	PBHMS
22	1	25-182	SWEEP & BIAS CONTROL PC BD ASSEMBLY
21	2	2-76-0001-40	STANDOFF
20	1	25-197	MOUNTING BRACKET
19	1	TA 255	"T & B"/EQUIV. BLADE TERMINAL
18	5	02-06-1132	"MOLEX"/EQUIV CRIMP TERMINAL
17	1	03-06-1055	"MOLEX"/EQUIV CABLE CONNECTOR
16	1	315-10002-3	"AMPHENOL"/EQUIV COAXIAL RELAY
15	1	25-181	MAIN DIODE SWITCH
14	1	25-227	SEMI-RIGID COAX ASSEMBLY
13			
12	1	25-189	SINGLE SIDE BAND MODULE
11	4	#6	INTERNAL TOOTH LOCKWASHER
10	4	#6-32 x 5/16	PBHMS
9	1	76-243	"MICROWAVE ASSOC"/EQUIV MPS-517 X-BAND FRONT END
8	72	#4	INTERNAL TOOTH LOCKWASHER
7	73	#4-40 x 5/16	PBHMS
6	1	28-161	RF GASKET
5	1	25-160	END PLATE
4	4	25-159	HOUSING BLOCK
3	1	25-188	VCO MODULE ASSEMBLY
2	1	25-163	FLOOR
1	1	3-25-192	FLOOR ASSEMBLY

LIST OF MATERIALS

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS .xx ± .010 .xxx ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS

DRAWN Ron Eyck DATE 8-15-78
CHECKED DATE
APPROVED DATE 11-6-78

- IFR INC. -
WICHITA, KANSAS

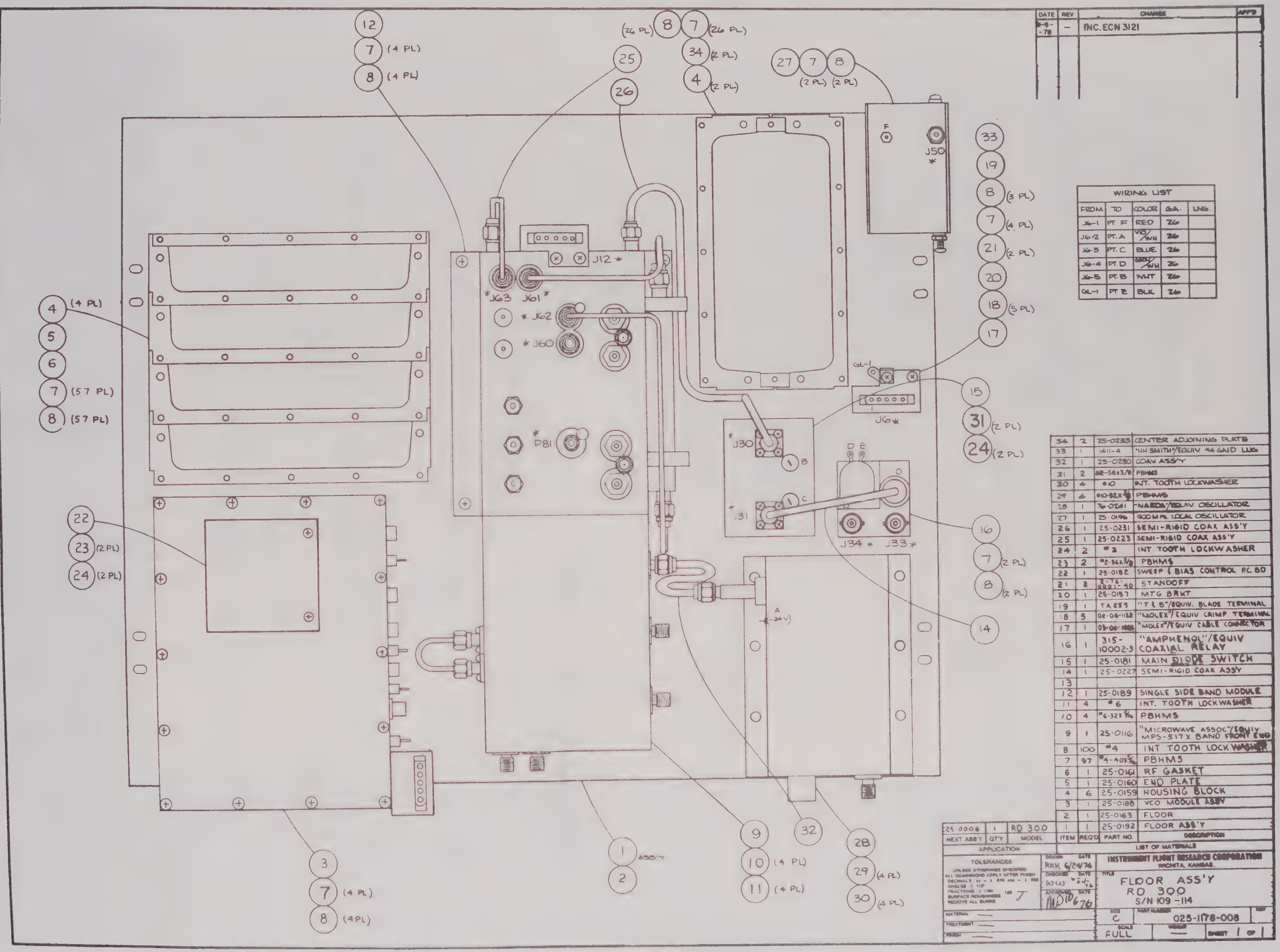
TITLE
FLOOR ASSEMBLY
S/N 106-108

MATERIAL
FINISH

SIZE C
PART NUMBER 025-1178-007
REV —
SCALE 1" = 1"
WEIGHT
SHEET 1 OF 1

MODEL RD-300
QTY 1
APPLICATION
NEXT ASSY 25-0006

Fig. 10-5-3



DATE	REV	CHANGE	APP'D
8-9-78	–	INC. ECN 3121	

WIRING LIST

FROM	TO	COLOR	GA.	LNG.
J6-1	PT F	RED	26	
J6-2	PT A	VIO/WH	26	
J6-3	PT C	BLUE	26	
J6-4	PT D	GRY/WH	26	
J6-5	PT B	WHT	26	
GL-1	PT E	BLK	26	

ITEM	REQ'D	PART NO.	DESCRIPTION
34	2	25-0235	CENTER ADJOINING PLATE
33	1	1411-4	"ILH SMITH"/EQUIV #4 GND LUG
32	1	25-0230	COAX ASS'Y
31	2	88-56x3/8	PBHMS
30	4	#0	INT. TOOTH LOCKWASHER
29	4	#0-82x1/4	PBHMS
28	1	76-0241	"NARDA"/EQUIV. OSCILLATOR
27	1	25-0196	900 MHz LOCAL OSCILLATOR
26	1	25-0231	SEMI-RIGID COAX ASS'Y
25	1	25-0223	SEMI-RIGID COAX ASS'Y
24	2	#2	INT TOOTH LOCKWASHER
23	2	#2-56x3/8	PBHMS
22	1	25-0182	SWEEP & BIAS CONTROL PC BD
21	8	X-76-0881-40	STANDOFF
20	1	25-0197	MTG BRKT
19	1	TA255	"T & B"/EQUIV. BLADE TERMINAL
18	5	02-06-1132	"MOLEX"/EQUIV CRIMP TERMINAL
17	1	03-06-1088	"MOLEX"/EQUIV CABLE CONNECTOR
16	1	315-10002-3	"AMPHENOL"/EQUIV COAXIAL RELAY
15	1	25-0181	MAIN DIODE SWITCH
14	1	25-0227	SEMI-RIGID COAX ASS'Y
13			
12	1	25-0189	SINGLE SIDE BAND MODULE
11	4	#6	INT. TOOTH LOCKWASHER
10	4	#6-32x5/16	PBHMS
9	1	25-0116	"MICROWAVE ASSOC"/EQUIV MPS-517X BAND FRONT END
8	100	#4	INT TOOTH LOCKWASHER
7	97	#4-40x5/16	PBHMS
6	1	25-0161	RF GASKET
5	1	25-0160	END PLATE
4	6	25-0159	HOUSING BLOCK
3	1	25-0188	VCO MODULE ASS'Y
2	1	25-0163	FLOOR
1	1	25-0192	FLOOR ASS'Y

25-0006	1	RD 300
NEXT ASS'Y	QTY	MODEL

APPLICATION

LIST OF MATERIALS

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS ± .02 = ± .010 .xxx = ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125 J
REMOVE ALL BURRS

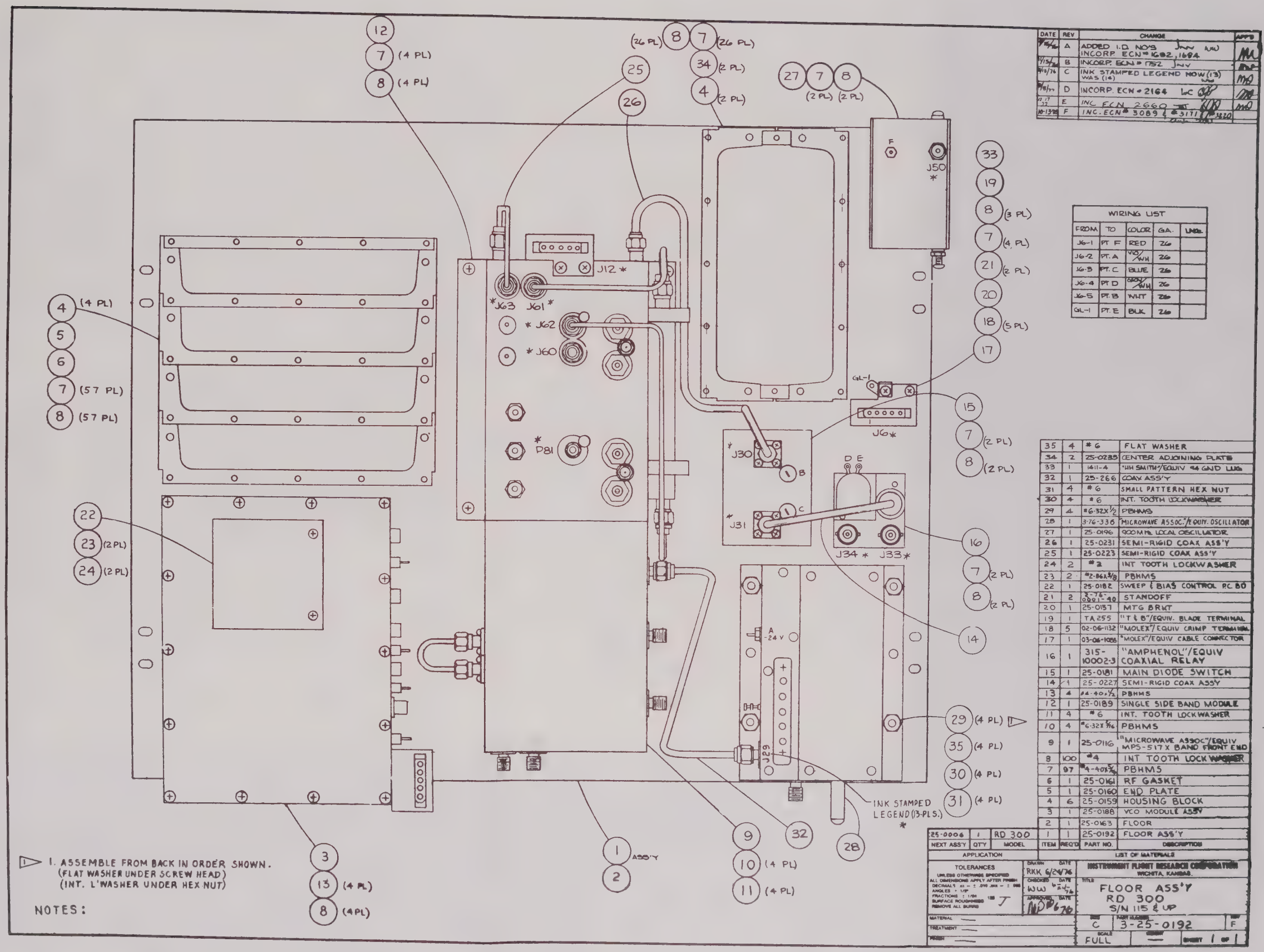
DRAWN RRK 6/24/76
CHECKED WW 6-24-76
APPROVED MD 6/26/76
MATERIAL
TREATMENT
FINISH

INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS

TITLE
FLOOR ASS'Y
RD 300
S/N 109 -114

SIZE C
PART NUMBER 025-1178-008
REV
SCALE FULL
WEIGHT
SHEET 1 OF 1

Fig. 10-5-4



DATE	REV	CHANGE	APPD
7/14/76	A	ADDED I.D. NO'S JWV INCORP. ECN's #682, 1694	MM
7/15/76	B	INCORP. ECN # 1752 JWV	MM
9/8/76	C	INK STAMPED LEGEND NOW (13) WAS (14) JWV	MM
9/6/77	D	INCORP. ECN # 2164 WC	MM
12-17-77	E	INC. ECN 2660	MM
10-13-78	F	INC. ECN # 3089 & 3171	MM

WIRING LIST

FROM	TO	COLOR	GA.	LNGTH
J6-1	PT. F	RED	26	
J6-2	PT. A	VIO/WH	26	
J6-3	PT. C	BLUE	26	
J6-4	PT. D	GRN/WH	26	
J6-5	PT. B	WHT	26	
GL-1	PT. E	BLK	26	

35	4	# 6	FLAT WASHER
34	2	25-0235	CENTER ADJOINING PLATE
33	1	1411-4	"UH SMITH"/EQUIV #4 GND LUG
32	1	25-266	COAX ASS'Y
31	4	# 6	SMALL PATTERN HEX NUT
30	4	# 6	INT. TOOTH LOCKWASHER
29	4	#6-32X1/2	PBHMS
28	1	376-336	MICROWAVE ASSOC."/EQUIV. OSCILLATOR
27	1	25-0196	900 MHz LOCAL OSCILLATOR
26	1	25-0231	SEMI-RIGID COAX ASS'Y
25	1	25-0223	SEMI-RIGID COAX ASS'Y
24	2	# 2	INT TOOTH LOCKWASHER
23	2	#2-56X3/8	PBHMS
22	1	25-0182	SWEEP & BIAS CONTROL PC BD
21	2	3-78-0001-40	STANDOFF
20	1	25-0151	MTG BRKT
19	1	TA 255	"T & B"/EQUIV. BLADE TERMINAL
18	5	02-06-1132	"MOLEX"/EQUIV CRIMP TERMINAL
17	1	03-06-1065	"MOLEX"/EQUIV CABLE CONNECTOR
16	1	315-10002-3	"AMPHENOL"/EQUIV COAXIAL RELAY
15	1	25-0181	MAIN DIODE SWITCH
14	1	25-0227	SEMI-RIGID COAX ASS'Y
13	4	#4-40X1/2	PBHMS
12	1	25-0189	SINGLE SIDE BAND MODULE
11	4	# 6	INT. TOOTH LOCKWASHER
10	4	#6-32X5/16	PBHMS
9	1	25-0116	"MICROWAVE ASSOC"/EQUIV MPS-517X BAND FRONT END
8	100	#4	INT TOOTH LOCK WASHER
7	97	#4-40X5/16	PBHMS
6	1	25-0161	RF GASKET
5	1	25-0160	END PLATE
4	6	25-0159	HOUSING BLOCK
3	1	25-0188	VCO MODULE ASS'Y
2	1	25-0163	FLOOR
1	1	25-0192	FLOOR ASS'Y
ITEM	REQ'D	PART NO.	DESCRIPTION

25-0006	1	RD 300
NEXT ASS'Y	QTY	MODEL

APPLICATION — LIST OF MATERIALS

TOLERANCES UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH DECIMALS ANGLES FRACTIONS SURFACE ROUGHNESS REMOVE ALL BURRS

DRAWN RKK 6/24/76 — CHECKED WW — APPROVED MD 6/30

MATERIAL — TREATMENT — FINISH

HUTCHINSON FLIGHT RESEARCH CORPORATION WICHITA, KANSAS

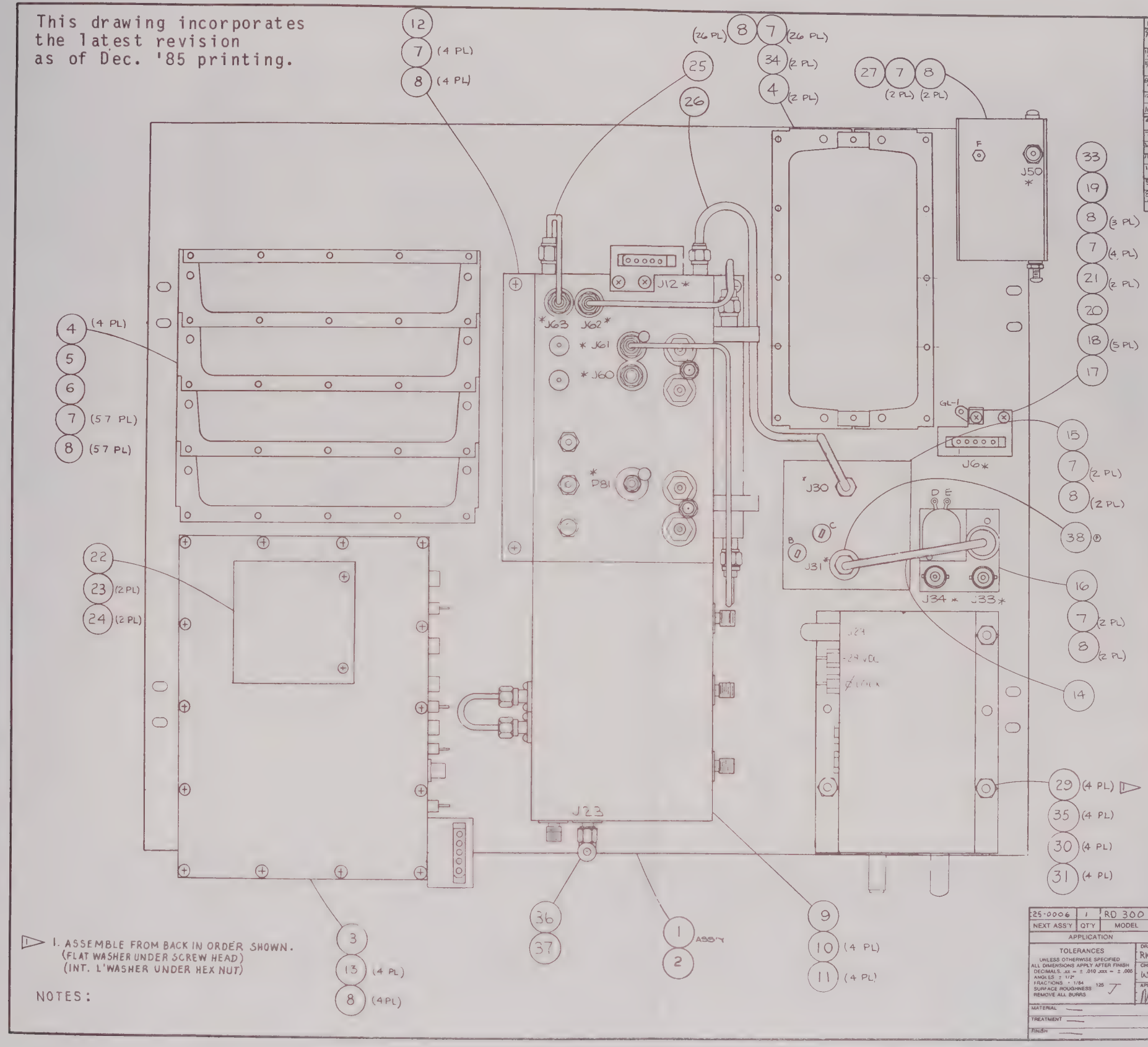
TITLE: FLOOR ASS'Y RD 300 S/N 115 & UP

SIZE C — PART NUMBER 3-25-0192 — REV F

SCALE FULL — SHEET 1 OF 1

Fig. 10-5-5

This drawing incorporates the latest revision as of Dec. '85 printing.



DATE	REV	CHANGE	APP'D
8/6/76	A	ADDED I.D. NO'S JNV WW INCORP. ECN # 1682, 1684	MW
11/5/76	B	INCORP. ECN # 1752 JNV	MW
9/8/76	C	INK STAMPED LEGEND NOW (13) WAS (14) WW	MW
9/5/77	D	INCORP. ECN # 2164 WC	MW
7/17/78	E	INC. ECN 2660 JAT	MW
10-13-78	F	INC. ECN # 3089 & #3171 & #3220	
4-13-79	G	INC. ECN # 3335 RLD	
7-13-79	H	INC. ECN # 3383 RLD	
10-25-79	J	INC. ECN # 3419 RLD	
11-26-79	K	UPDATED REV. LETTER 3313 RLD	
12-14-79	L	INC. ECN # 3430 RLD	
5-1-80	M	INC. ECN 3477 RLD	
8-5-81	N	INC ECN 3692 JC WW	
11-6-82	P	INC ECN 7847 AO	

WIRING LIST

FROM	TO	COLOR	GA.	LNG.
J6-1	PT F	RED	26	
J6-2	PT A	VIO/WH	26	
J6-3	PT B	BLUE	26	
J6-4	PT D	GRY/WH	26	
J6-5	PT C	WHT	26	
GL-1	PT E	BLK	26	

ITEM	REQ'D	PART NO.	DESCRIPTION
37	1	3M-20	"WEINSCHEL"/EQUIV. 2838 PAD
36	1	60-8918-000	"AEP"/EQUIV 50° SMA ADAPTER
35	4	#6	FLAT WASHER
34	2	25-0235	CENTER ADJOINING PLATE
33	1	1404	"HH SMITH"/EQUIV #4 GND LUG
32			
31	4	#6	SMALL PATTERN HEX NUT
30	4	#6	INT. TOOTH LOCKWASHER
29	4	#6-32X1/2	PBHMS
28	1	3-76-336	MICROWAVE ASSOC."/EQUIV. OSCILLATOR
27	1	25-0196	900 MHz LOCAL OSCILLATOR
26	1	25-0231	SEMI-RIGID COAX ASS'Y
25	1	25-0223	SEMI-RIGID COAX ASS'Y
24	2	#2	INT TOOTH LOCKWASHER
23	2	#2-56X3/8	PBHMS
22	1	25-0182	SWEEP & BIAS CONTROL P.C. BD
21	2	2-76-0001-40	STANDOFF
20	1	25-0157	MTG BRKT
19	1	TA 255	"T & B"/EQUIV. BLADE TERMINAL
18	5	02-06-1132	"MOLEX"/EQUIV CRIMP TERMINAL
17	1	03-06-1056	"MOLEX"/EQUIV CABLE CONNECTOR
16	1	315-10002-3	"AMPHENOL"/EQUIV COAXIAL RELAY
15	1	25-278	MAIN DIODE SWITCH
14	1	25-0227	SEMI-RIGID COAX ASS'Y
13	4	#4-40X1/2	PBHMS
12	1	25-0189	SINGLE SIDE BAND MODULE
11	4	#6	INT. TOOTH LOCKWASHER
10	4	#6-32X5/16	PBHMS
9	1	25-0116	"MICROWAVE ASSOC"/EQUIV MPS-517X BAND FRONT END
8	100	#4	INT TOOTH LOCKWASHER
7	97	#4-40X5/16	PBHMS
6	1	25-0161	RF GASKET
5	1	25-0160	END PLATE
4	6	25-0159	HOUSING BLOCK
3	1	25-0188	VCO MODULE ASS'Y
2	1	25-0163	FLOOR
1	1	25-0192	FLOOR ASS'Y

25-0006 | 1 | RD 300 — NEXT ASS'Y | QTY | MODEL — APPLICATION

LIST OF MATERIALS

TOLERANCES: UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH DECIMALS .XX = ± .010 .XXX = ± .005 ANGLES ± 1/2° FRACTIONS ± 1/64 SURFACE ROUGHNESS 125 REMOVE ALL BURRS

DRAWN RKK 6/24/76 | CHECKED WW 6-24-76 | APPROVED MWD 6/24/76

MATERIAL | TREATMENT | FINISH

INSTRUMENT FLIGHT RESEARCH CORPORATION WICHITA, KANSAS.

TITLE: FLOOR ASS'Y RD 300 S/N 115 & UP 3-25-192

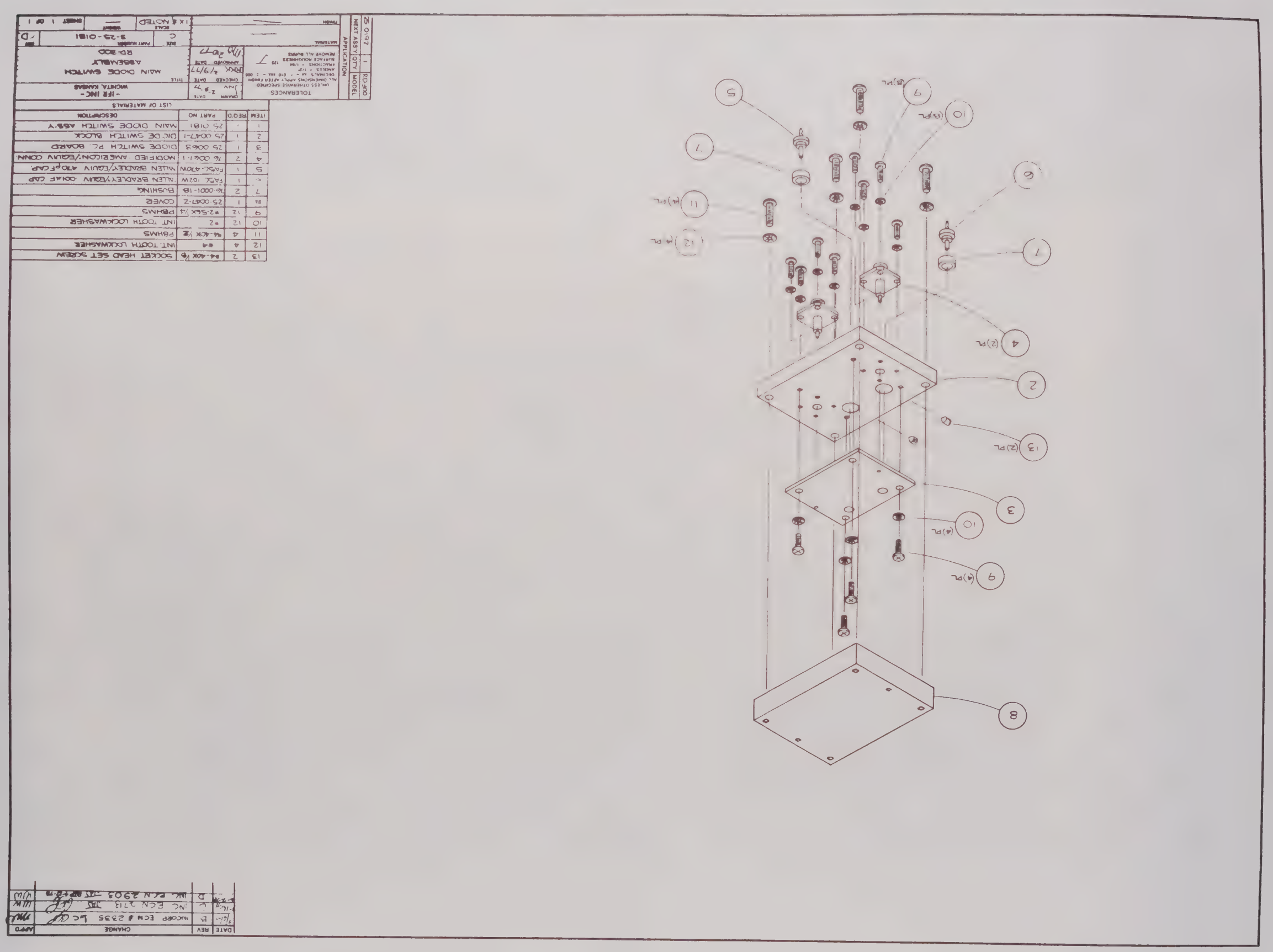
SIZE C | PART NUMBER 7006-2519-200 | REV P

SCALE FULL | WEIGHT | SHEET 1 OF 1

NOTES:

1. ASSEMBLE FROM BACK IN ORDER SHOWN. (FLAT WASHER UNDER SCREW HEAD) (INT. L'WASHER UNDER HEX NUT)

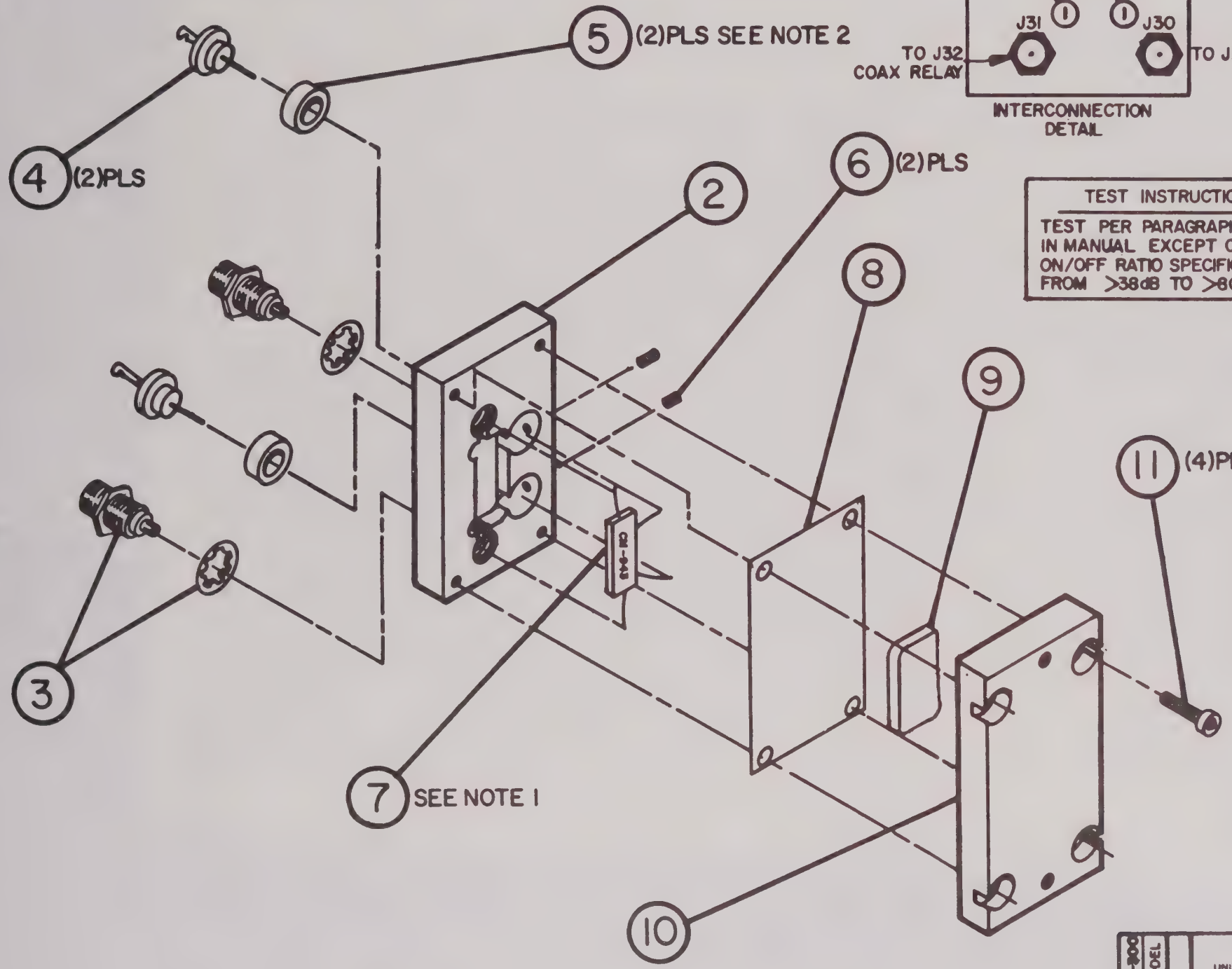
Fig. 10-5-6

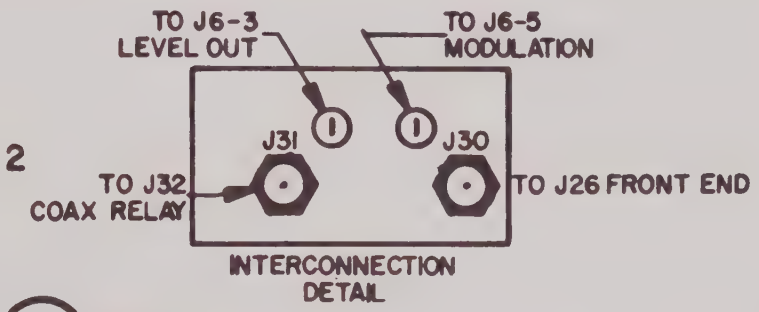


TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS ± .010 FRACTIONS ± 1/64
ANGLES ± 1/2°
SURFACE ROUGHNESS 125
REMOVE ALL BURRS
MATERIAL
FINISH
APPLICATION
NEXT ASSY
QTY
MODEL
25 OCT 77
RD-300
DRAWN
DATE
CHECKED
DATE
APPROVED
DATE
-IFR INC-
WICHITA KANSAS
TITLE
MAIN DIODE SWITCH
ASSEMBLY
RD-300
PART NUMBER
25-0181
SIZE
C
SCALE
1X & NOTED
SHEET 1 OF 1
LIST OF MATERIALS
ITEM
REQ'D
PART NO
DESCRIPTION
1
1
25 0181
MAIN DIODE SWITCH ASS'Y
2
1
25 0047-1
DIODE SWITCH BLOCK
3
1
25 0063
DIODE SWITCH P.C. BOARD
4
2
76 0041-1
MODIFIED AMERICON/EQUIV CONN.
5
1
FASC-470W
ALLEN BRADLEY/EQUIV .001MF CAP
6
1
FASC-102W
ALLEN BRADLEY/EQUIV 470pF CAP
7
2
76-0001-18
BUSHING
8
1
25-0047-2
COVER
9
12
#2-56X 1/4
PBHMS
10
12
#2
INT TOOTH LOCKWASHER
11
4
#4-40X 1/2
PBHMS
12
4
#4
INT. TOOTH LOCKWASHER
13
2
#4-40X 1/8
SOCKET HEAD SET SCREW
DATE
REV
CHANGE
APP'D

Fig. 10-6

DATE	REV	CHANGE	APP'D





TEST INSTRUCTIONS

TEST PER PARAGRAPH 5-22 IN MANUAL EXCEPT CHANGE ON/OFF RATIO SPECIFICATION FROM >38dB TO >80dB.

ITEM	REQ'D	PART NO.	DESCRIPTION
11	4	#4-40x3/8	SHCS
10	1	2-25-0257	COVER
9	1	1-18-0245	COMPRESSION PAD
8	1	1-18-0244	GROUNDING SHIM
7	1	CM-943	"CROWN"/EQUIV. DIODE SWITCH MODULE
6	2	#4-40x1/8	SOCKET HEAD SET SCREW
5	2	1-76-0001-18	BUSHING
4	2	FA5C-102W	"ALLEN-BRADLEY"/EQUIV FEEDTHRU CAP .001mf
3	2	60-9939-090	"AEP"/EQUIV SMA FEMALE CONNECTOR & HDW.
2	1	2-25-0256	DIODE SWITCH BLOCK
1	1	2-25-0258	DIODE SWITCH ASSEMBLY RD-300 MOD.

LIST OF MATERIALS

MODEL	RD-300
QTY	1
APPLICATION	
NEXT ASSY	25-0152

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: .xx = ± .010 .xxx = ± .005
ANGLES: ± 1/2°
FRACTIONS: ± 1/64
SURFACE ROUGHNESS 125 J
REMOVE ALL BURRS

DRAWN TenEyck DATE 12-27-77
CHECKED DATE 12-27-77
APPROVED DATE 12-30-77

MATERIAL
FINISH

-IFR INC-
WICHITA, KANSAS

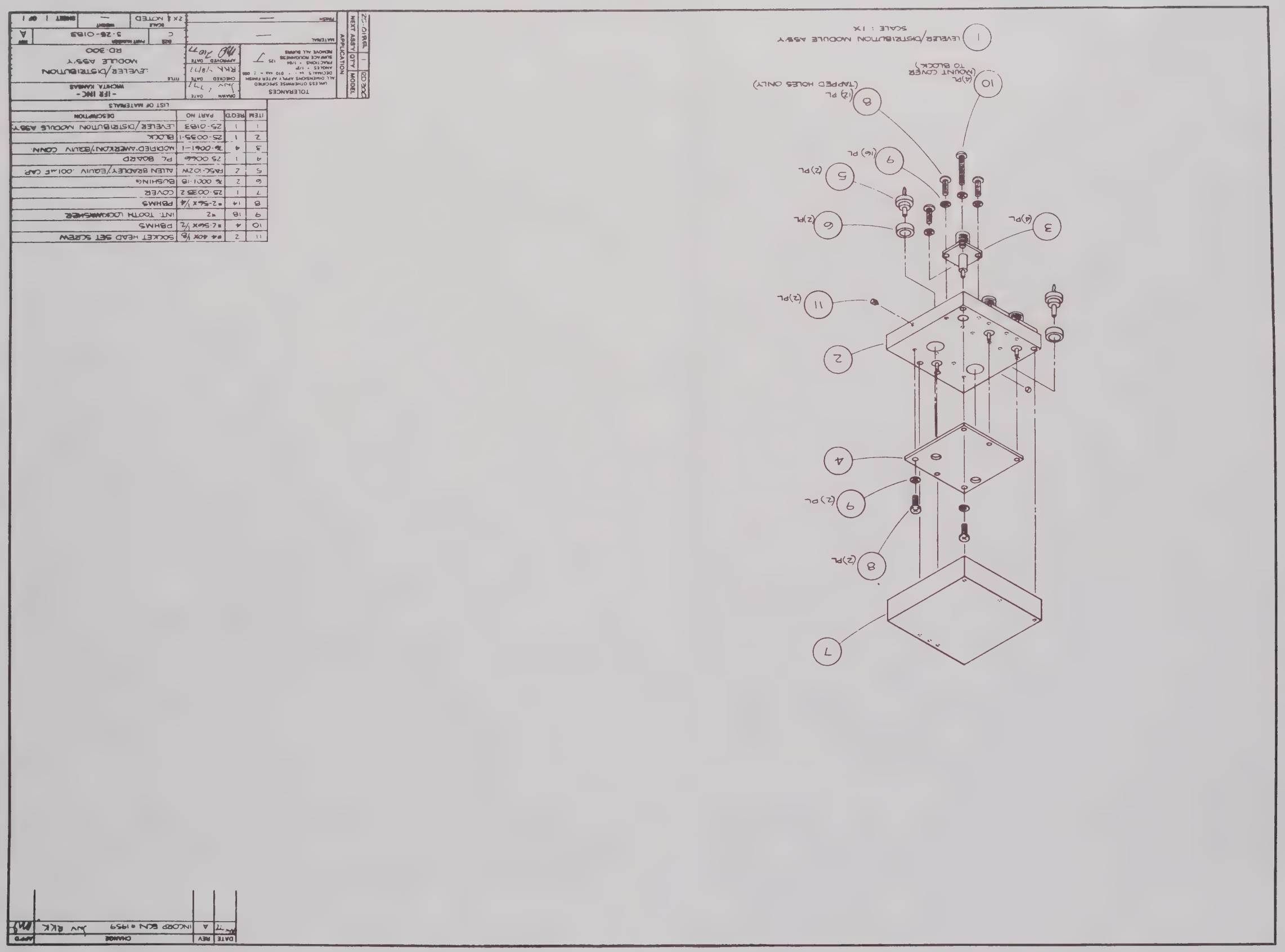
TITLE
HIGH ISOLATION
DIODE SWITCH ASSEMBLY
RD-300 OPTION

SIZE B | PART NUMBER 2-25-0258 | REV —
SCALE 2=1 | WEIGHT — | SHEET 1 OF 1

2. INSERT ITEM 5 BUSHING AND SECURE WITH ITEM 6
. SET SCREW AS INDICATED
1. SOLDER ITEM 7 LEADS TO ITEMS 3 & 4 WITH P/N TOWARDS ITEM 8 SHIM.

NOTES:

Fig. 10-7



ITEM	REQ'D	PART NO	DESCRIPTION
1	1	25-0183	LEVELER/DISTRIBUTION MODULE ASS'Y
2	1	25-0035-1	BLOCK
3	4	76-0061-1	MODIFIED AMERICON/EQUIV CONN.
4	1	25 0066	PL BOARD
5	2	FASC-102W	ALLEN BRADLEY/EQUIV .001μF CAP.
6	2	76 0001-18	BUSHING
7	1	25-0035 2	COVER
8	14	#2-56X 1/4	PBHMS
9	18	#2	INT. TOOTH LOCKWASHER
10	4	#2-56X 1/2	PBHMS
11	2	#4 40X 1/8	SOCKET HEAD SET SCREW

LIST OF MATERIALS

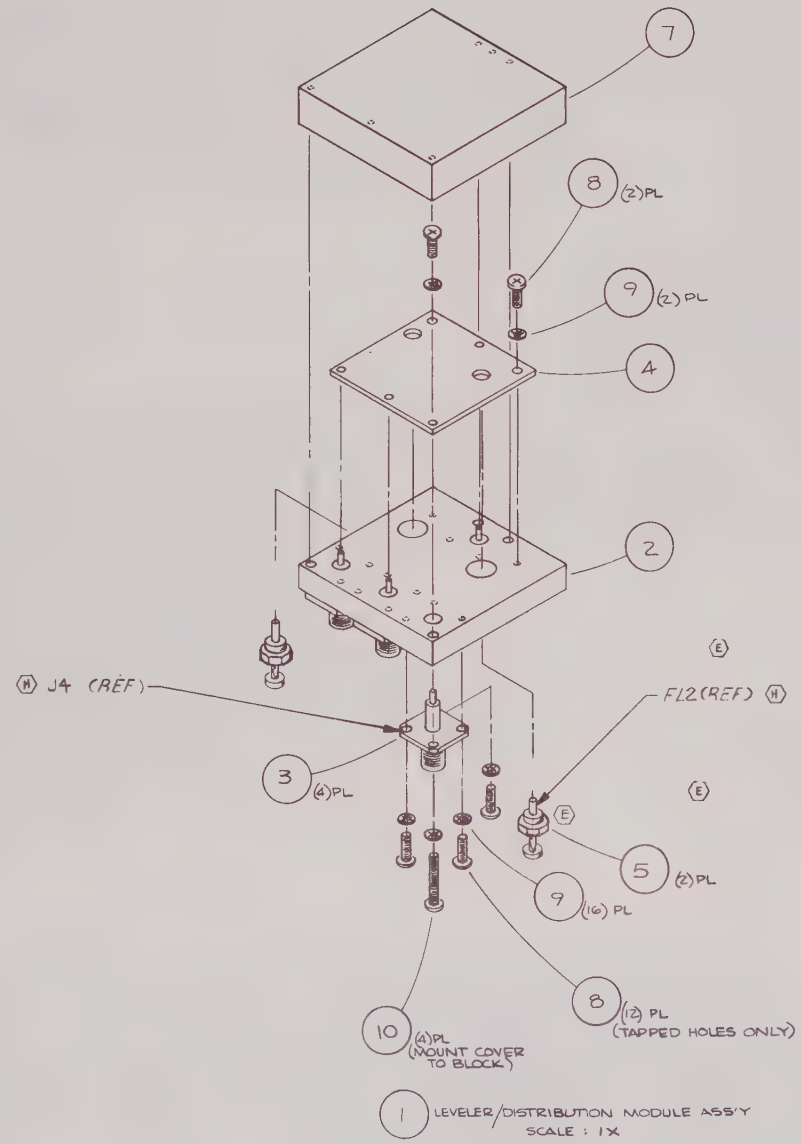
TOLERANCES	DRAWN	DATE	-IFR INC- WICHITA, KANSAS
UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH DECIMALS ± .010 XX ± .005 ANGLES ± 1/2° FRACTIONS ± 1/64 SURFACE ROUGHNESS 125 REMOVE ALL BURRS	CHECKED	DATE	TITLE: LEVELER/DISTRIBUTION MODULE ASS'Y RD-300
	APPROVED	DATE	
MATERIAL —			SIZE C — PART NUMBER 5-25-0183 — REV A
FINISH —			SCALE 2X 1 NOTED — WEIGHT — SHEET 1 OF 1

NEXT ASSY	QTY	MODEL
APPLICATION	1	RD 300

DATE	REV	CHANGE	APPD
7/7	A	INCORP ECN #1959 JNV RKK	

Fig. 10-8

DATE	REV	CHANGE	APP'D
8/29/77	A	INCORP. ECN #1959 JNV RKK	MJ
11-16-79	C	UPDATED REV. LETTER 3313 RLD	RL
4-25-88	D	INC ECN 3477 RLD	BL
7/5/88	E	INC ECN #6625 MTI	VH
3-26-85	F	INC ECN #6837 RW	TZ
8-27-85	G	INC RC 7571 MKM	VLH
4/26/86	H	INC RC 7953 DAH	VLH
1-3-86	J	INC RC 8133 JS	OJ
4-13-87	K	INC ECN 9719 RB	VLH



NOTES:

1. ALL RESISTORS ARE 1/4 W., 10% TOLERANCE EXCEPT AS NOTED.
2. ALL CAPACITOR VALUES ARE IN µF EXCEPT AS NOTED.
3. COMPONENENT HEIGHT TO BE .15 MAX. FROM TOP OF BOARD.
4. ASSEMBLE P.C. BOARD TO BLOCK PRIOR TO MOUNTING COMPONENTS ON BOARD.
5. * DENOTES 1% RESISTOR TOLERANCE.
6. (E) WHEN ASSY IS USED ON RD 301, COMPONENTS HAVE A REFERENCE DESIGNATOR SERIES OF 24 XXX (e.g., R1 is R24001, C12 is C24012, etc).
7. (G) REF. SCHEMATIC 0000-2511-100.

ITEM	REQ'D	PART NO.	DESCRIPTION
(E) 10	4	#2-56X 1/2	PBHMS
9	18	#2	INT. TOOTH LOCKWASHER
8	14	#2-56X 1/4	PPHMS
7	1	25-0035-2	COVER
(E) –			
(E) 5	2	5801-0000-006	FILTER, EMI/REI, 1500pf, 8-32 DIA.
(G) 4	1	1700-2506-100	P.C. BOARD
3	4	76-0061-1	MODIFIED AMERICON/EQUIV CONN.
2	1	25-0035-1	BLOCK
1	1	25-0183	LEVELER/DISTRIBUTION MODULE ASS'Y

LIST OF MATERIALS

NEXT ASS'Y	QTY	MODEL
7005-4940-500	1	RD 301
7030-2518-300	1	RD 300

APPLICATION

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS .XX = ± .010 .XXX = ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125 J
REMOVE ALL BURRS

MATERIAL —
FINISH —

DRAWN JNV DATE 2-7-77
CHECKED RKK DATE 2/8/77
APPROVED MJ DATE 2/10/77

-IFR INC-
WICHITA, KANSAS

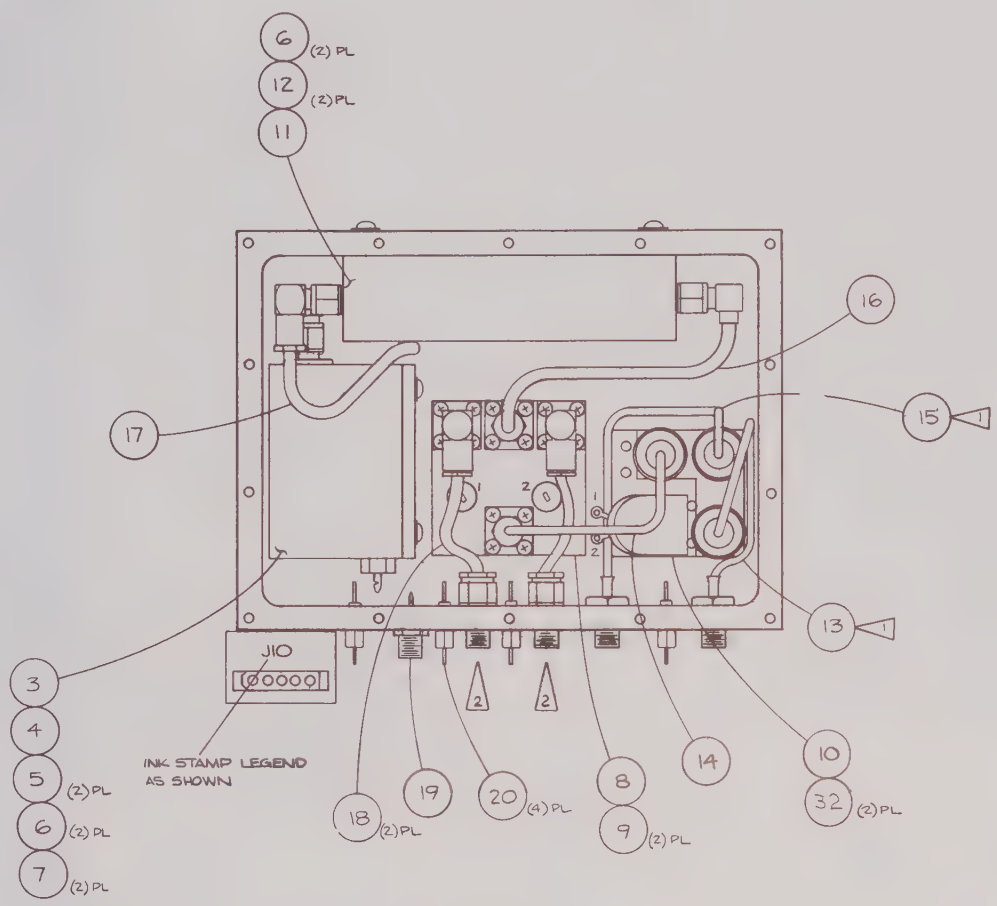
TITLE
LEVELER/DISTRIBUTION MODULE ASS'Y RD-300

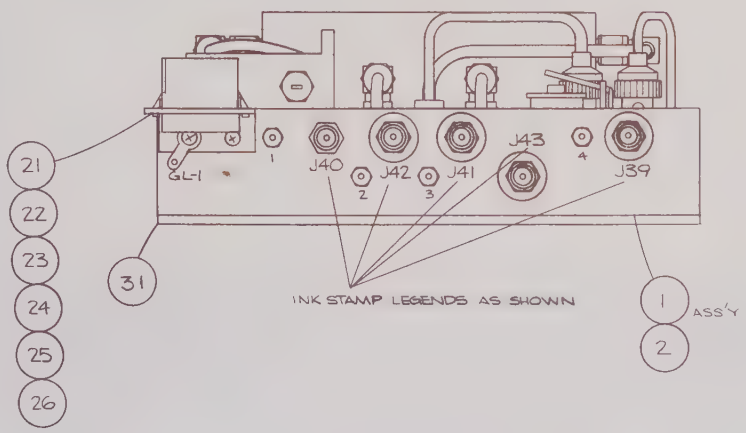
SIZE C | PART NUMBER 7030-2518-300 | REV K
SCALE 2X & NOTED | WEIGHT — | SHEET 1 OF 1

Fig. 10-8-1

DATE	REV	CHANGE	APP'D
8/17/86	K	INC ECN 8892	VLH

DATE	REV	CHANGE	APP'D
9/7/76	A	ADDED I.D. NOS	JNV
11/5/76	B	INCORP ECN #1753	JNV
11/23/76	C	INCORP ECN # 1810	JNV
2/8/77	D	CORRECT ERRORS IN WIRING LIST	JNV
7/22/77	E	ADDED FLAG NOTE #2	JNV
8/5/77	F	INCORP. ECN # 2164	LLC
11-16-79	G	UPDATED REV. LETTER 3313 RLD	
4-29-80	H	INC ECN 3477 RLD	
4-7-83	J	INC ECN 4068 TE	SB





NOTES:

1. PLACE ¼ EXT. TOOTH LOCKWASHER (ITEM 30) BETWEEN RF CONN. AND MOUNTING PLATE.
2. THREAD COAXES INTO PLACE SECURE INTO PLACE WITH HEX NUTS SUPPLIED WITH COAXES.

WIRING LIST

ITEM	FROM	TO	COLOR	GA.	
1	J10-1	GL-1	BLACK	26	
2	J10-2	FILTER #4	GRN	26	
3	FILTER #4	RELAY #1	GRN	26	
4	RELAY #2	VCO GND TERM.	BLACK	26	
5	J10-3	FILTER #3	WHT/GRN	26	
6	FILTER #3	LEVELER #2	WHT/GRN	26	
7	J10-4	FILTER #2	BLUE	26	
8	FILTER #2	LEVELER #1	BLUE	26	
9	J10-5	FILTER #1	GRAY	26	
10	FILTER #1	VCO -18V TERM	GRAY	26	
11	VCO -18V TERM	VCO GND TERM.	.01	DISC CAP	
12	RF CONN.	VCO V-TUNE TERM	BUSS	26	(SLEEVE)

ITEM	REQ'D	PART NO.	DESCRIPTION	
32	2	#4-40x5/16	PFHMS	
31	1	25-0255	SPACER PLATE	
30	2	¼"	EXT. TOOTH LOCKWASHER	
29	14	#4-40x1⅜	PBH MS	
28	1	25-0040	VCO MODULE UPPER HALF	NOT SHOWN
27	1	25-0255	RF GASKET	NOT SHOWN
26	2	#2	INT. TOOTH LOCKWASHER	
25	1	2850-0096-2249	/EQUIV GROUND LUG	(K)
24	2	#2-56x¼	PBHMS	
23	5	02-06-1132	*MOLEX*/EQUIV CRIMP SOCKET	
22	1	03-06-2033	*MOLEX*/EQUIV.(5)PIN CONN	
21	1	25-0204	CONNECTOR MOUNTING BRKT	
20	4	85955-1	*AMP* EQUIV. FILTER	
19	1	60-9939-04	" AEP /EQUIV. SMA CONN.	
18	2	25-0044-1	FLEXIBLE COAX ASS'Y	
17	1	25-0044-2	FLEXIBLE COAX ASS'Y	
16	1	25-0203	SEMI-RIGID COAX ASS'Y	
15	1	25-0043	SEMI-RIGID COAX ASS'Y	1
14	1	25-0042	SEMI-RIGID COAX ASS'Y	
13	1	25-0041	SEMI-RIGID COAX ASS'Y	1
12	2	#4-40x½	PBHMS	
11	1	00-0153	*ADDINGTON*/EQUIV CIRCULATOR	
10	1	315-1002-3	*AMPHENOL*/EQUIV. RELAY	
9	2	#2-56x½	PFHMS	
8	1	25-0188	LEVELER/DIST. MODULE ASS'Y	
7	2	#4-40x½	PFHMS	
6	18	#4	INT. TOOTH LOCKWASHER	
5	2	#4-40x⅜	PBHMS	
4	1	25-0038	VCO MOUNTING BLOCK	
3	1	74-0002	*SOLID STATE*/EQUIV VCO	
2	1	25-0039	VCO MODULE, LOWER HALF	
1	1	25-0188	VCO MODULE ASS'Y	

NEXT ASS'Y	QTY	MODEL
1-25-0188	1	RD-300

APPLICATION

LIST OF MATERIALS

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS xx = ± .010 .xxx = ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS

MATERIAL

TREATMENT

FINISH

DRAWN JNV 5/17/76
CHECKED WW 5/17/76
APPROVED MW 7/10/76

INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS

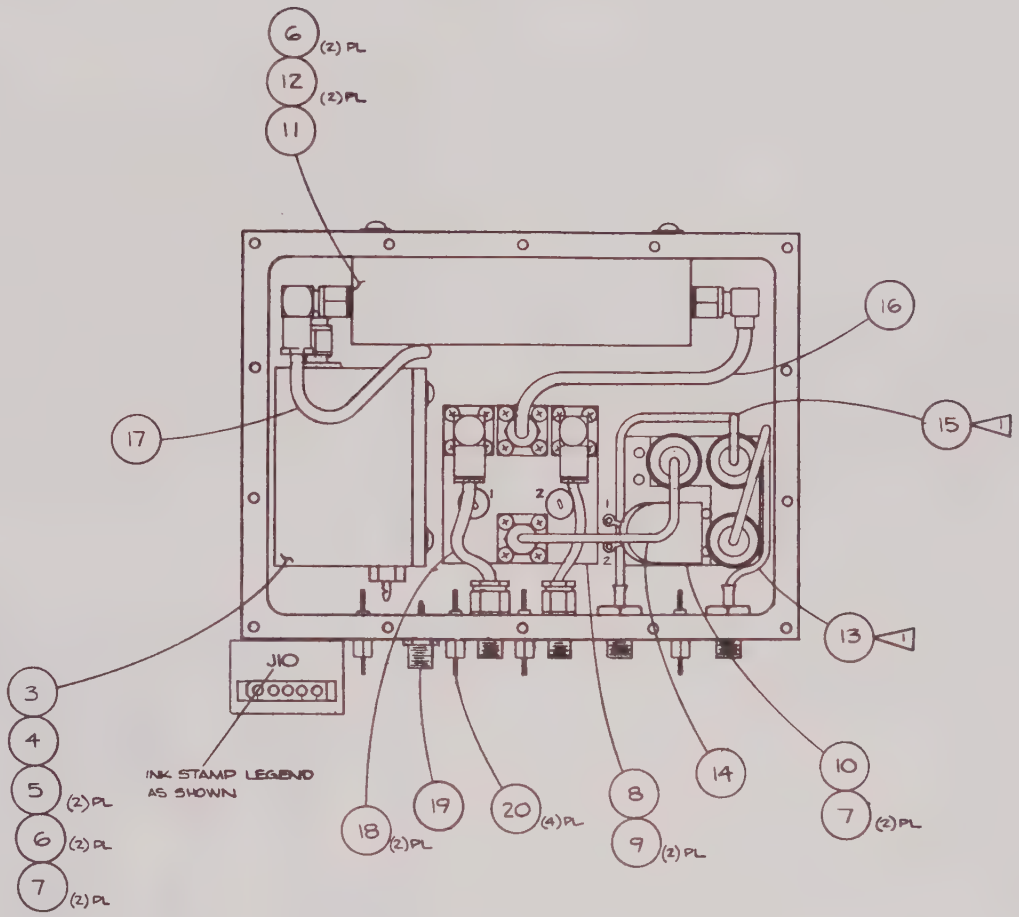
TITLE
VCO MODULE ASS'Y
RD-300

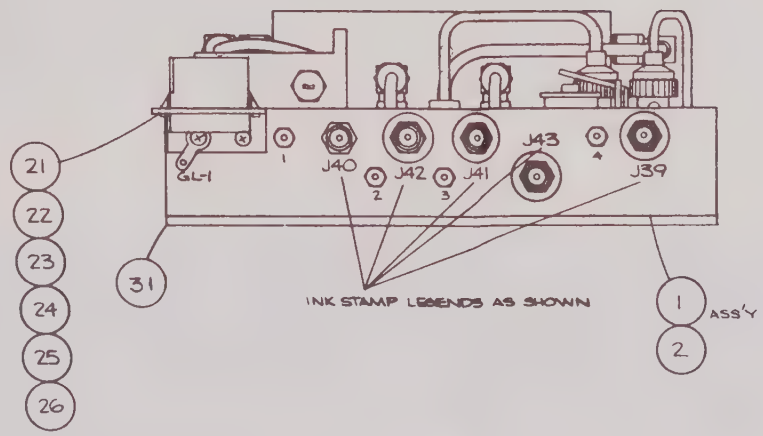
SIZE C | PART NUMBER 1030-2518-800 | REV K

SCALE 1 X | WEIGHT — | SHEET 1 OF 1

Fig. 10-9-1

DATE	REV	CHANGE	APP'D
9/7/76	A	ADDED I.D. NO'S JNV bW	
9/15/76	B	INCORP ECN # 1798 JNV	
11/3/76	C	INCORP ECN # 1810 JNV	
2/16/77	D	CORRECT ERRORS IN WIRING LIST JNV	
4/22/77	E	ADDED FLAG NOTE #2 JNV	
8/5/77	F	INCORP. ECN # 2164 LC	





WIRING LIST				
ITEM	FROM	TO	COLOR	GA.
1	J10-1	GL-1	BLACK	26
2	J10-2	FILTER #4	GRN	26
3	FILTER #4	RELAY #1	GRN	26
4	RELAY #2	VCO GND TERM.	BLACK	26
5	J10-3	FILTER #3	WHT/GRN	26
6	FILTER #3	LEVELER #2	WHT/GRN	26
7	J10-4	FILTER #2	BLUE	26
8	FILTER #2	LEVELER #1	BLUE	26
9	J10-5	FILTER #1	GRAY	26
10	FILTER #1	VCO -18V TERM	GRAY	26
11	VCO -18V TERM	VCO GND TERM	.01	DISC CAP
12	RF CONN.	VCO V TUNE TERM	BUSS	26 (SLEEVE)

NOTES:
1. PLACE 1/4 EXT. TOOTH LOCKWASHER (ITEM 30) BETWEEN RF CONN. AND MOUNTING PLATE.

ITEM	REQ'D	PART NO.	DESCRIPTION
31	1	25-0235	SPACER PLATE
30	2	1/4"	EXT. TOOTH LOCKWASHER
29	14	#4-40 X 1 1/2	PBH MS
28	1	25-0040	VCO MODULE UPPER HALF
27	1	25-0235	RF GASKET
26	2	#2	INT. TOOTH LOCKWASHER
25	1	118	"ZIERICK"/EQUIV GROUND LUG
24	2	#2-56 X 1/4	PBHMS
23	5	02-06-1132	"MOLEX"/EQUIV CRIMP SOCKET
22	1	03-09-2032	"MOLEX"/EQUIV (3) PIN CONN
21	1	25-0204	CONNECTOR MOUNTING BRKT
20	4	85955-1	"AMP" EQUIV. FILTER
19	1	60-9939-09	" AEP "/EQUIV SMA CONN.
18	2	25-0044-1	FLEXIBLE COAX ASS'Y
17	1	25-0044-2	FLEXIBLE COAX ASS'Y
16	1	25-0203	SEMI-RIGID COAX ASS'Y
15	1	25-0043	SEMI-RIGID COAX ASS'Y
14	1	25-0042	SEMI-RIGID COAX ASS'Y
13	1	25-0041	SEMI-RIGID COAX ASS'Y
12	2	#4-40 X 1/2	PBHMS
11	1	00-0153	"ADDINGTON"/EQUIV CIRCULATOR
10	1	515-10002-3	"AMPHENOL"/EQUIV. EDGE
9	2	#2-56 X 1/2	PFHMS
8	1	25-0188	LEVELER/DIST. MODULE ASS'Y
7	4	#4-40 X 1/2	PFHMS
6	18	#4	INT. TOOTH LOCKWASHER
5	2	#4-40 X 3/16	PBHMS
4	1	25-0038	VCO MOUNTING BLOCK
3	1	76-0008	"SOLID STATE"/EQUIV VCO
2	1	25-0039	VCO MODULE, LOWER HALF
1	1	25-0188	VCO MODULE ASS'Y

NEXT ASS'Y	QTY	MODEL
1-25-0188	1	RD-300

APPLICATION

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS .xx = ± .010 .xxx = ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125 J
REMOVE ALL BURRS

MATERIAL
TREATMENT
FINISH

DRAWN JNV 5/17/76
CHECKED WW 5/17/76
APPROVED JNV 7/19/76

INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS

TITLE
VCO MODULE ASS'Y
RD-300

SIZE C | PART NUMBER 1-25-0188 | REV F
SCALE 1X | WEIGHT — | SHEET 1 OF 1

Fig. 10-9

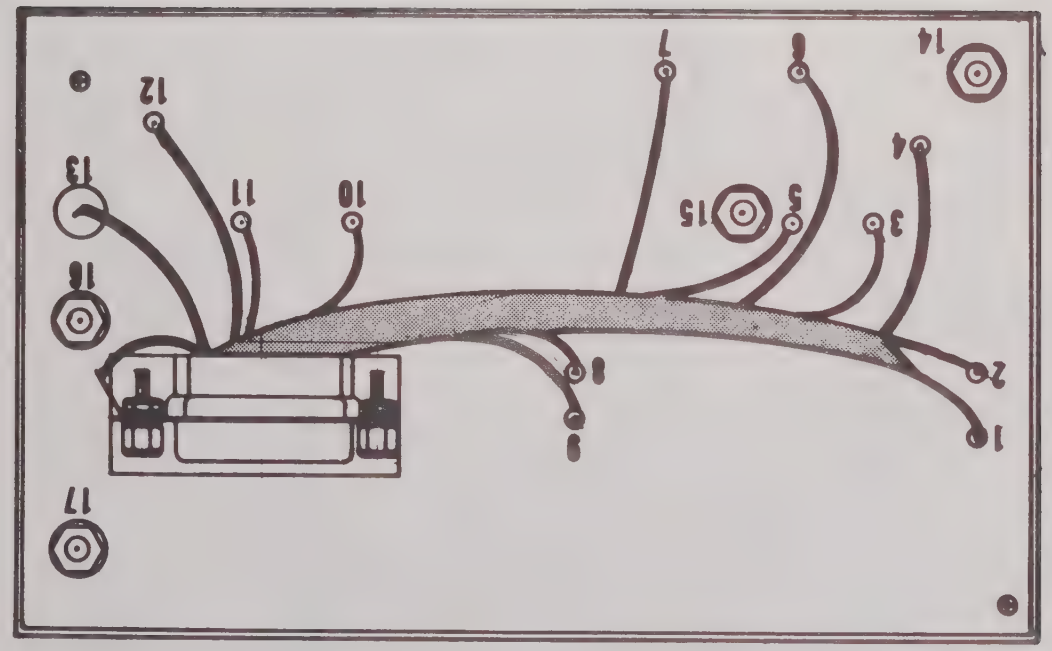
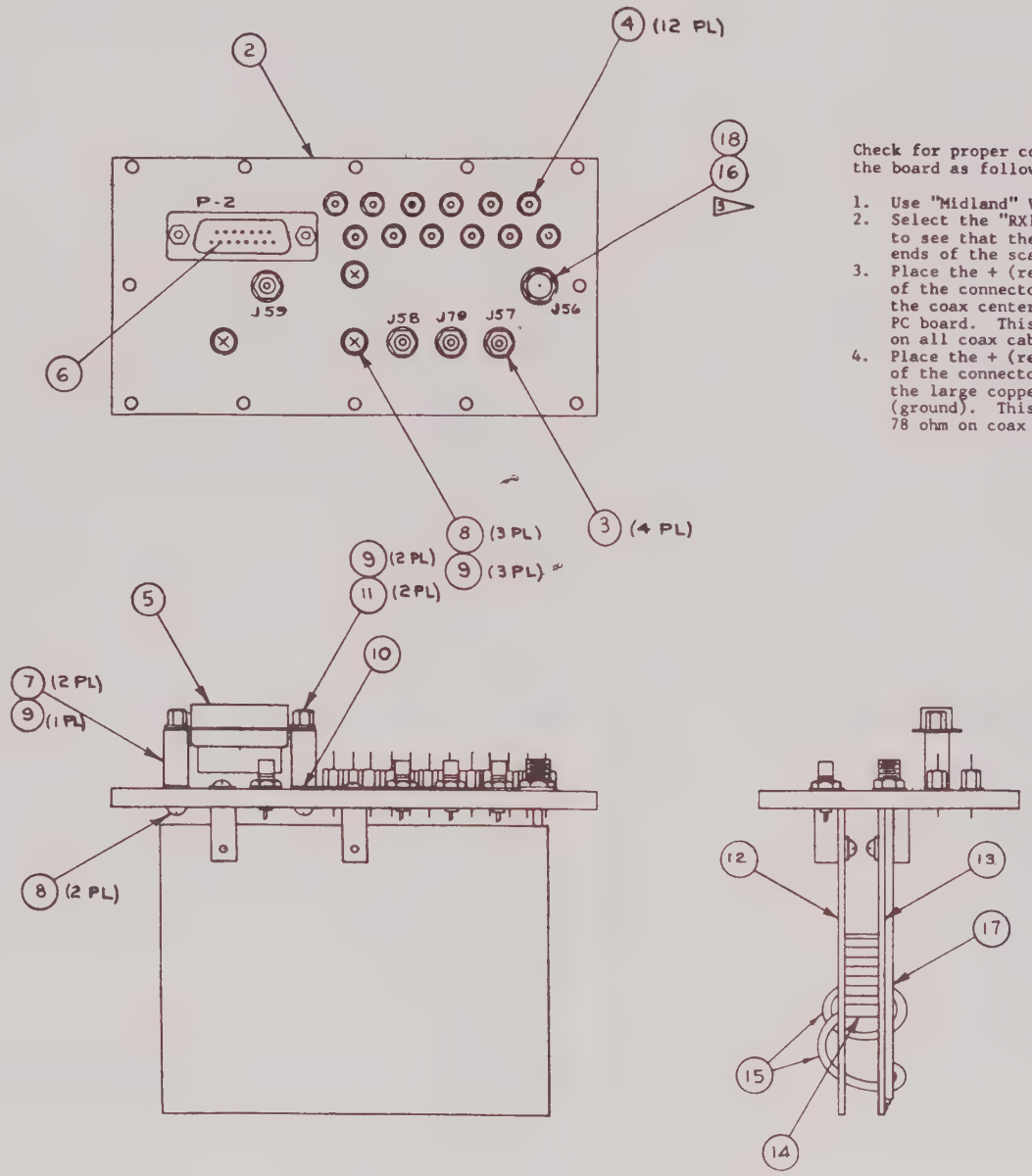


FIG. 10-10
30 MHZ DISCRIMINATOR
EFFECTIVE TO S/N 109
TOP VIEW

DATE	REV	CHANGE	APP'D
[illegible]	A	INC ECN # 1889	WW
[illegible]	A-1	INC ECN # 2881	WW
[illegible]	B	INC ECN 3190	WW



CHECKOUT PROCEDURE

Check for proper coax continuity after completion of the board as follows:

1. Use "Midland" VOM Model 23-107 or similar.
2. Select the "RX1" setting on the meter and check to see that the meter is properly zeroed on both ends of the scale.
3. Place the + (red) lead on the center conductor of the connector and the common (black) lead on the coax center conductor where it enters the PC board. This should obtain a reading of 0 ohms on all coax cables.
4. Place the + (red) lead on the center conductor of the connector and the common (black) lead on the large copper area on top of the board (ground). This should read between 58 ohm and 78 ohm on coax cable.

NOTES:

1. REFER TO ASS'Y PROCEDURE #1-34-0100-2 FOR PROPER RIGID COAX ASS'Y INSTRUCTIONS. INSPECT PER CHECKOUT PROCEDURE LISTED ABOVE RIGHT.
2. ATTACH RIGID COAX ASS'Y TO P.C. BOARD AS FOLLOWS:
   a. LIGHTLY SAND OUTER JACKET OF COAX WITH #400 GRIT SANDPAPER TO REMOVE OXIDATION AND OTHER CONTAMINATES.
   b. SOLDER COAX JACKET TO PC BOARD USING NO MORE THAN ABOUT A 40 WATT SOLDER IRON AND HEAT COAX FOR AS SHORT A PERIOD OF TIME AS POSSIBLE. LIQUID FLUX MAY BE USED IF NECESSARY (DO NOT USE SOLDERING PASTE).

3 PLACE 1/4" EXTERIOR TOOTH LOCKWASHER (ITEM 18) BETWEEN RF CONN. AND MOUNTING PLATE.

ITEM	REQ'D	PART NO	DESCRIPTION
18	1	1/4"	EXT TOOTH LOCKWASHER
17	1	1-00-0167-0350	SEMI-RIGID COAX
16	1	529001	"CABLEWAVE SYSTEMS"/EQUIV SMA BLKHEAD CONN.
15	A/R	RG178 B/U	"BELDEN"/EQUIV. FLEXIBLE COAX
14	A/R	FSN-22A-8	"ANSLEY"/EQUIV FLEXSTRIP
13	1	1-25-0241	30 MHz DISCRIMINATOR, PC BD. "B" ASS'Y
12	1	1-25-0240	30MHz DISCRIMINATOR, PC BD. "A" ASS'Y
11	2	1-76-0013-2	SHELL NUT
10	1	1411-4	"HH SMITH"/EQUIV GROUND LUG #4
9	6	#4	INT TOOTH LOCKWASHER
8	5	#4-40-3/8	PBHMS
7	2	2-76-0001-36	STANDOFF
6	13	205310-8	"AMP"/EQUIV CRIMP PIN
5	1	205206-1	"AMP"/EQUIV 15 PIN CONNECTOR
4	12	859555-1	"AMP"/EQUIV FEEDTHRU FILTER
3	4	51-045-0000	"SEALECTRO"/EQUIV SMB MALE CON
2	1	2-25-0244	MTG PLATE 30 MHz DISC ASS'Y
1	1	25-0242	30 MHz DISC ASS'Y

LIST OF MATERIALS

25-0242 | 1 | RD-300 | EXT ASS'Y | QTY | MODEL | APPLICATION

TOLERANCES UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH DECIMALS .XX ± .010 .XXX ± .005 ANGLES ± 1/2° FRACTIONS ± 1/64 SURFACE ROUGHNESS REMOVE ALL BURRS

DRAWN RKK DATE 1/18/77
CHECKED WW DATE 1/24/77
APPROVED MW DATE 1/24/77

MATERIAL —
FINISH —

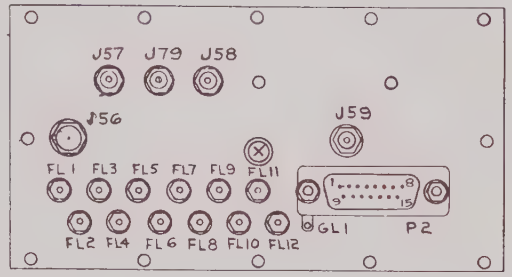
-IFR INC-
WICHITA, KANSAS

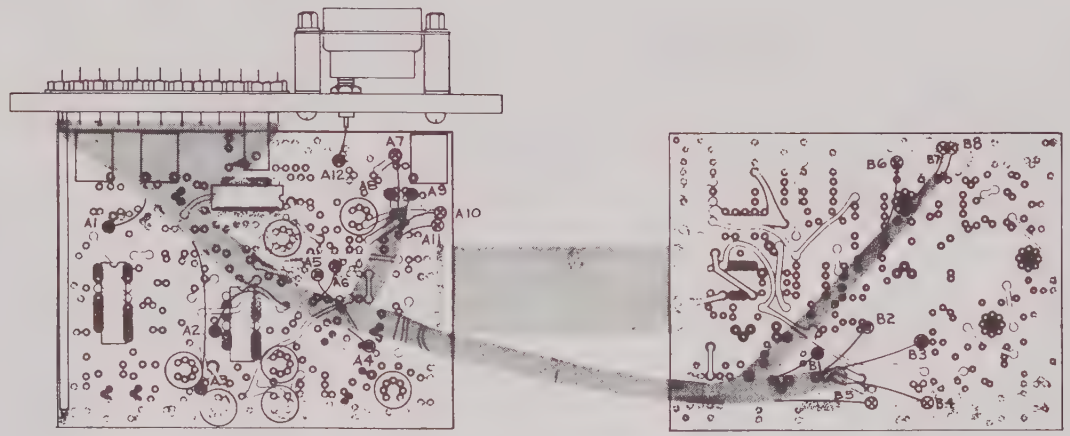
TITLE 30 MHz DISCRIMINATOR ASS'Y

SIZE C | PART NUMBER 3-25-0242 | REV B
SCALE 1:1 | WEIGHT — | SHEET 1 OF 2

Fig. 10-11-1

DATE	REV	CHANGE	APP'D
		SEE SHT 1 OF 2	





WIRING LIST				
FROM	TO	COLOR	SIZE	LENGTH
P2-1	FL9	VIO	26	
P2-2	—			
P2-3	FL7	BRN	26	
P2-4	FL4	GRY	26	
P2-5	FL5	BLU	26	
P2-6	FL1	WHT/GRN	26	
P2-7	FL10	WHT/RED	26	
P2-8	FL2	GRY	26	
P2-9	FL11	GRN	26	
P2-10	FL6	ORN	26	
P2-11	FL12	RED	26	
P2-12	FL8	YEL	26	
P2-13	—			
P2-14	GL1	BLK	26	
P2-15	FL3	WHT/VIO	26	
FL1	A4	WHT/GRN	26	
FL2	A3	GRY	26	
FL3	A6	WHT/VIO	26	
FL4	A8	GRY	26	

WIRING LIST, CONT.				
FROM	TO	COLOR	SIZE	LENGTH
FL5	A7	BLU	26	
FL6	A1	ORG	26	
FL7	A9	BRN	26	
FL8	A11	YEL	26	
FL9	B2	VIO	26	
FL10	B1	WHT/RED	26	
FL11	B5	GRN	26	
FL12	A10	RED	26	
J57	B7	WHT	26	
J58	B6	YEL/WHT	26	
J79	B8	WHT	26	
A2	B4	COAX		
A5	B3	COAX		
J59	A12	BUSS	26	

ITEM	REQ'D	PART NO.	DESCRIPTION
1	1	25-0242	30MHz DISCRIMINATOR ASS'Y

LIST OF MATERIALS

25-0242	NEXT ASS'Y	QTY	1
RD 300	MODEL		

APPLICATION

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS .XX = ± .010 .XXX = ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS

MATERIAL —
FINISH —

DRAWN RKK DATE 1/21/76
CHECKED WW DATE 1-24-76
APPROVED WW DATE 1-24-77

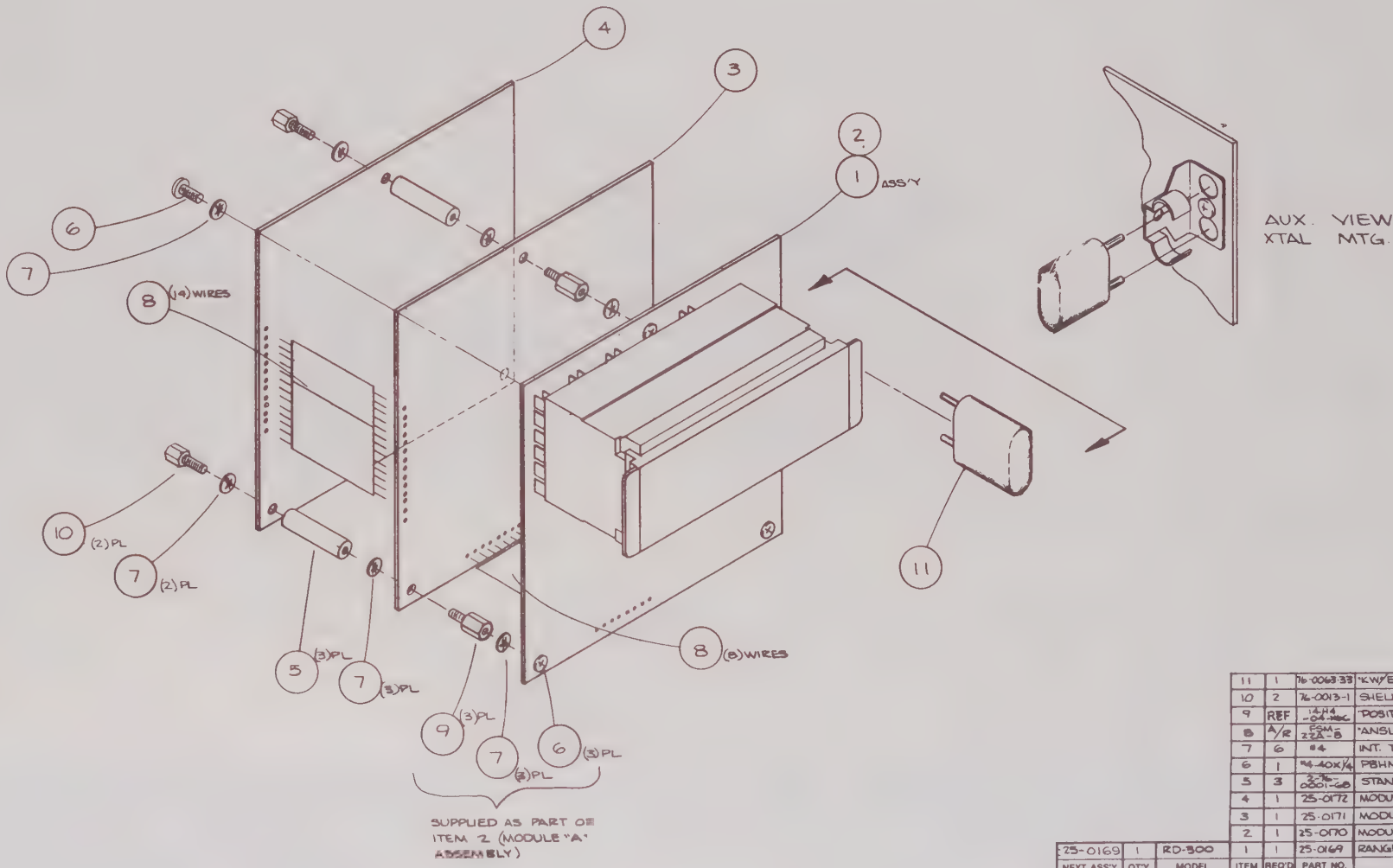
- IFR INC -
WICHITA, KANSAS

TITLE
30 MHz
DISCRIMINATOR ASS'Y

SIZE C | PART NUMBER 3-25-0242 | REV B
SCALE 1:1 | WEIGHT | SHEET 2 OF 2

Fig. 10-11-2

DATE	REV	CHANGE	APP'D
7/21/77	A	INCORPORATED ECN# 1886 JNV	
12/16/77	C	INCORPORATED ECN# 2499 JNV	



AUX. VIEW
XTAL MTG.

ITEM	REQ'D	PART NO.	DESCRIPTION
11	1	76-0063-33	*K.W. EQUIV XTAL 8.2365 MHz
10	2	76-0013-1	SHELL NUT
9	REF	1-414-04-HBC	*POSITRONICS EQUIV SHELL NUT
8	A/R	6044 22A-8	*ANSLEY EQUIV. FLEXSTRIP
7	6	#4	INT. TOOTH LOCKWASHER
6	1	#4-40X1/4	PBHMS
5	3	3-76-0801-08	STANDOFF
4	1	25-0172	MODULE "C" ASS'Y
3	1	25-0171	MODULE "B" ASS'Y
2	1	25-0170	MODULE "A" ASS'Y
1	1	25-0169	RANGE CONTOUR ASS'Y

LIST OF MATERIALS

NEXT ASS'Y	QTY	MODEL
25-0169	1	RD-300

APPLICATION

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: .XX = ± .010 .XXX = ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125 ✓
REMOVE ALL BURRS

MATERIAL SEE ABOVE
TREATMENT —
FINISH —

DRAWN JNV 6-7-76
CHECKED RKK 6/15/76
APPROVED MD 7/19/76

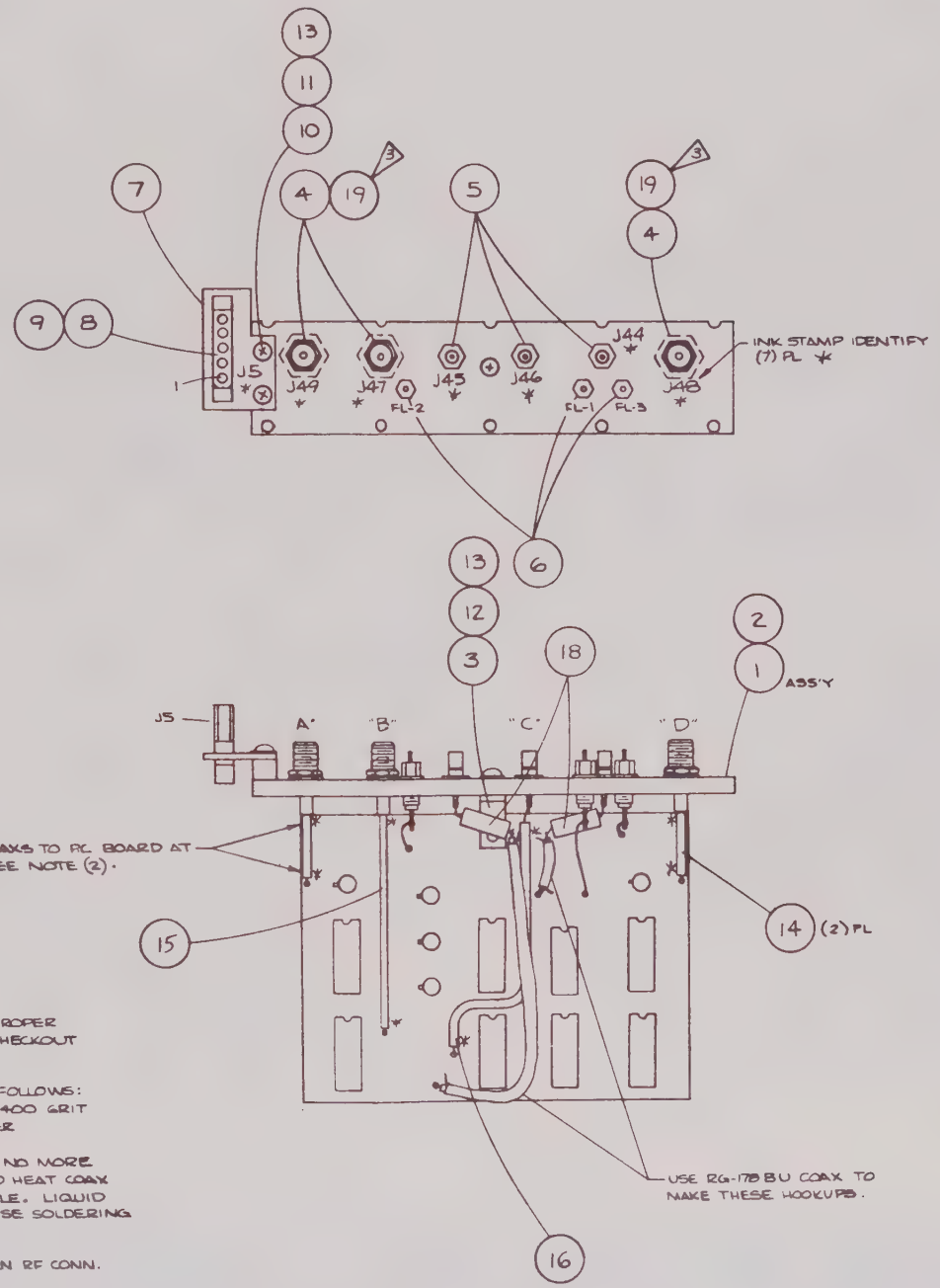
INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS.

TITLE
ASSEMBLY DETAILS
RANGE/CONTOUR ASS'Y
RD-300

SIZE C | PART NUMBER 25-0169 | REV C
SCALE 1/2 | WEIGHT — | SHEET 1 OF 1

Fig. 10-12

DATE	REV	CHANGE	APP'D
8-17	A	INCORP ECN. #1619 JNV	MD
9/15/76	B	ADDED CONN. ID. NO.S JNV WW & INCORP ECN #1716 & 1678	MD
9/15/76	C	INCORP. ECN #1807 JNV	MD
1/26 77	D	ADDED SECOND SHT. CHANGED SHT 1 of 1 TO SHT 1 of 2. RKK	MD



WIRE LIST				
FROM	TO	COLOR	SIZE	LNGTH
J5-1	FL-2	RED	#26	4½"
J5-2	FL-3	ORN	#26	6¾"
J5-3	FL-1	BLUE	#26	6¼"

CHECKOUT PROCEDURE

Check for proper coax continuity after completion of the board as follows:

1. Use "Midland" VOM Model 23-107 or similar.
2. Select the "RX1" setting on the meter and check to see that the meter is properly zeroed on both ends of the scale.
3. Place the + (red) lead on the center conductor of the connector and the common (black) lead on the coax center conductor where it enters the PC board. This should obtain a reading of 0 ohms on all coax cables.
4. Place the + (red) lead on the center conductor of the connector and the common (black) lead on the large copper area on top of the board (ground). This should read between 58 ohm and 78 ohm on coax cables A,B and D. Coax C should read between 49 ohm and 65 ohm.

NOTES:

1. REFER TO ASS'Y PROCEDURE #1-34-0100-2 FOR PROPER RIGID COAX ASS'Y INSTRUCTIONS. INSPECT PER CHECKOUT PROCEDURE LISTED AT RIGHT.
2. ATTACH RIGID COAX ASS'YS TO PC BOARD AS FOLLOWS:
   a. LIGHTLY SAND OUTER JACKET OF COAX WITH #400 GRIT SANDPAPER TO REMOVE OXIDATION AND OTHER CONTAMINATES.
   b. SOLDER COAX JACKET TO PC BOARD USING NO MORE THAN ABOUT A 40 WATT SOLDERING IRON AND HEAT COAX FOR AS SHORT A PERIOD OF TIME AS POSSIBLE. LIQUID FLUX MAY BE USED IF NECESSARY (DO NOT USE SOLDERING PASTE).

3 PLACE 1/4" EXT. TOOTH LOCKWASHER (ITEM 19) BETWEEN RF CONN. AND MOUNTING PLATE.

ITEM	REQ'D	PART NO.	DESCRIPTION
19	3	1/4"	EXT. TOOTH LOCKWASHER
18	2	1025-28	DELEVAN/EQUIV. CHOKE 2.2μH
17	A/R	RG-178BU	COAX
16	1	25-0219	COAX CABLE DETAIL
15	1	00-0167-288	COAX CABLE DETAIL
14	2	00-0167-138	COAX CABLE DETAIL
13	4	#4	INT. TOOTH LOCKWASHER
12	2	#4-40X 1/4	PBHMS
11	2	#4-40X 7/16	PBHMS
10	2	76-0001-1	STANDOFF
9	3	02-06-1132	"MOLEX"/EQUIV. CRIMP PIN
8	1	03-06-1055	"MOLEX"/EQUIV CONN.
7	1	25-0157	CONN. MTG. BRACKET
6	3	859555-1	"AMP"/EQUIV. FILTER
5	3	51-045-0000	"SEALECTRO"/EQUIV. CONN.
4	3	529001	"CABLEWAVE"/EQUIV. CONN.
3	1	25-0164	MTG BRACKET
2	1	25-0162	MTG PLATE
1	1	25-0176	PC BOARD ASS'Y

(NOT SHOWN)

3

NEXT ASS'Y	QTY	MODEL
25-0176	1	RD-300

APPLICATION

LIST OF MATERIALS

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS .XX = ± .010 .XXX = ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS

DRAWN JNV DATE 5-27-76
CHECKED RKK DATE 6/28/76
APPROVED MD DATE 6/28/76

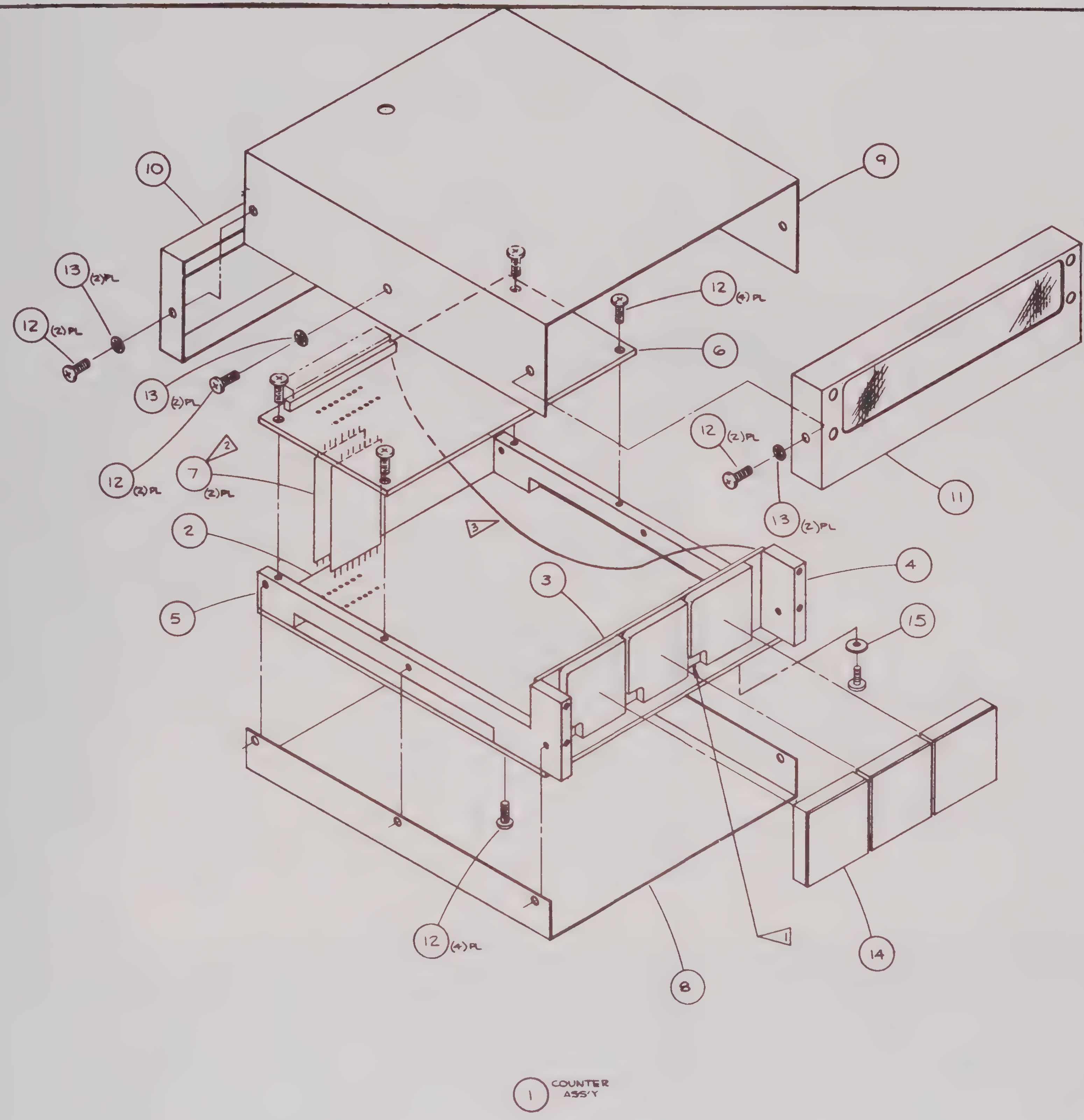
MATERIAL SEE ABOVE
TREATMENT —
FINISH —

INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS

TITLE
ASSEMBLY DETAILS
PRESCALER PC. BD.
RD-300

SIZE C | PART NUMBER 3-25-0176 | REV D
SCALE 1X | WEIGHT — | SHEET 1 OF 2

Fig. 10-13



DATE	REV	CHANGE	APP'D
2-18	B-1	INC ECN #797	
	C	INC ECN 2811	

NOTES:

1. ALIGN PC BOARD LANDS AND SOLDER TO CONNECT DISPLAY BOARD TO LOGIC BOARD.
2. SOLDER FLEXSTRIP BETWEEN LOGIC BOARD AND GATING BOARD. FOLD BETWEEN THESE BD'S WHEN ASSEMBLING.
3. AWG#26 ORG/WHT WIRE FROM P4-18 ON ITEM 6 TO R1 ON ITEM 3.

ITEM	REQ'D	PART NO.	DESCRIPTION
15	1	76-0002-9	PHENOLIC WASHER
14	3	SP-352	"SPE-…"/EQUIV READOUT
13	6	#4	INT. TOOTH LOCKWASHER
12	14	#4-40X1/4	PBHMS
11	1	25-0201	FRONT COVER
10	1	25-0200	REAR COVER
9	1	25-0199-2	COUNTER ENCLOSURE HALF
8	1	25-0199-1	COUNTER ENCLOSURE HALF
7	2	FSM-22A-8	"ANSLEY"/EQUIV FLEXSTRIP
6	1	25-0180	COUNTER GATING P.C. BOARD ASS'Y
5	1	25-0020-2	MOUNTING BRACKET
4	1	25-0020-1	MOUNTING BRACKET
3	1	25-0178	COUNTER DISPLAY P.C. BOARD ASS'Y
2	1	25-0179	COUNTER LOGIC P.C. BOARD ASS'Y
1	1	25-0177	COUNTER ASS'Y

LIST OF MATERIALS

NEXT ASS'Y	QTY	MODEL
25-0006	1	RD-300

APPLICATION

TOLERANCES UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH DECIMALS: .xx = ± .010 .xxx = ± .005 ANGLES ± 1/2° FRACTIONS ± 1/64 SURFACE ROUGHNESS REMOVE ALL BURRS

MATERIAL —

FINISH —

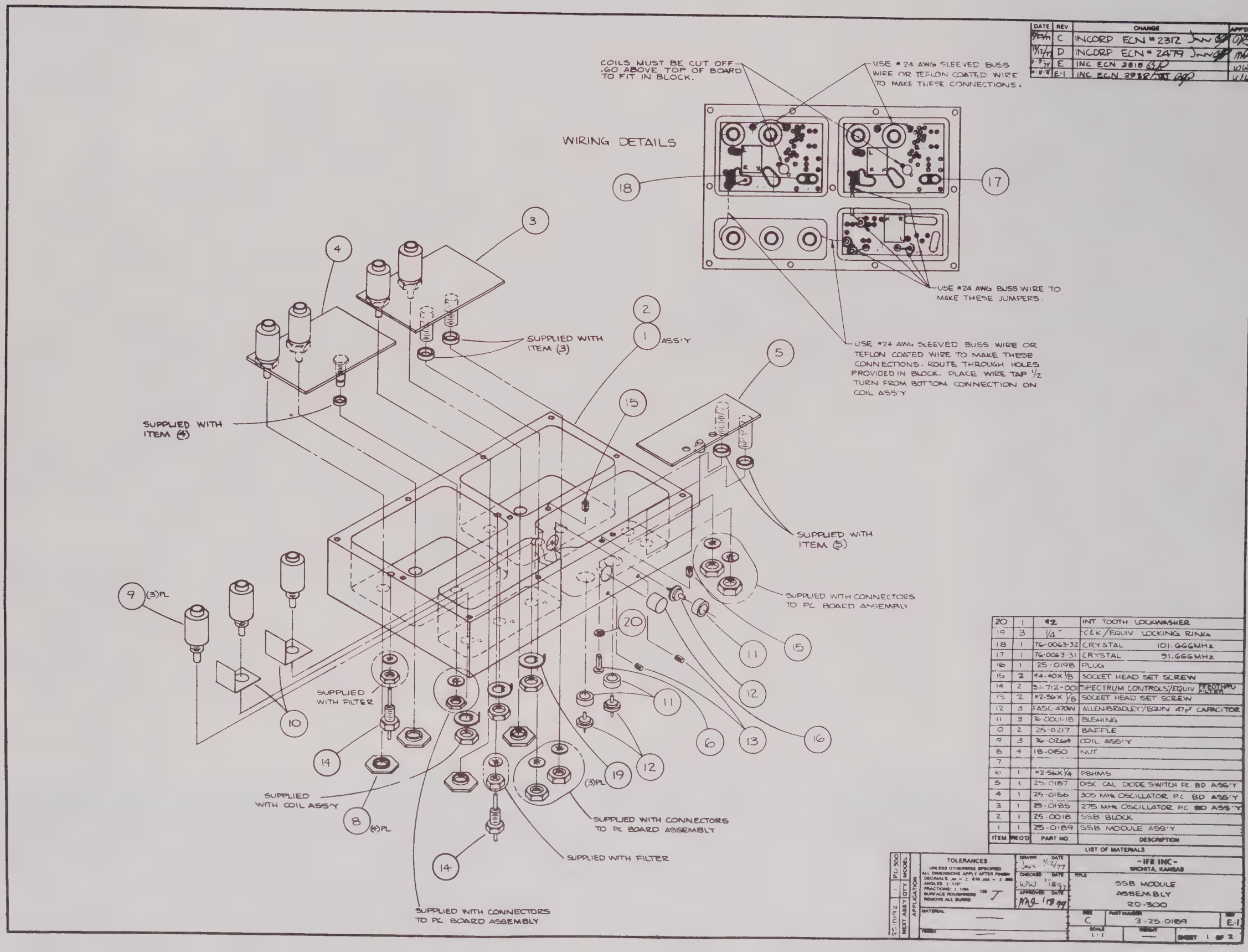
DRAWN JNV 2-2-77 · CHECKED RKK 2/8/77 · APPROVED 2/10/77

- IFR INC -
WICHITA, KANSAS

TITLE: COUNTER ASS'Y RD-300

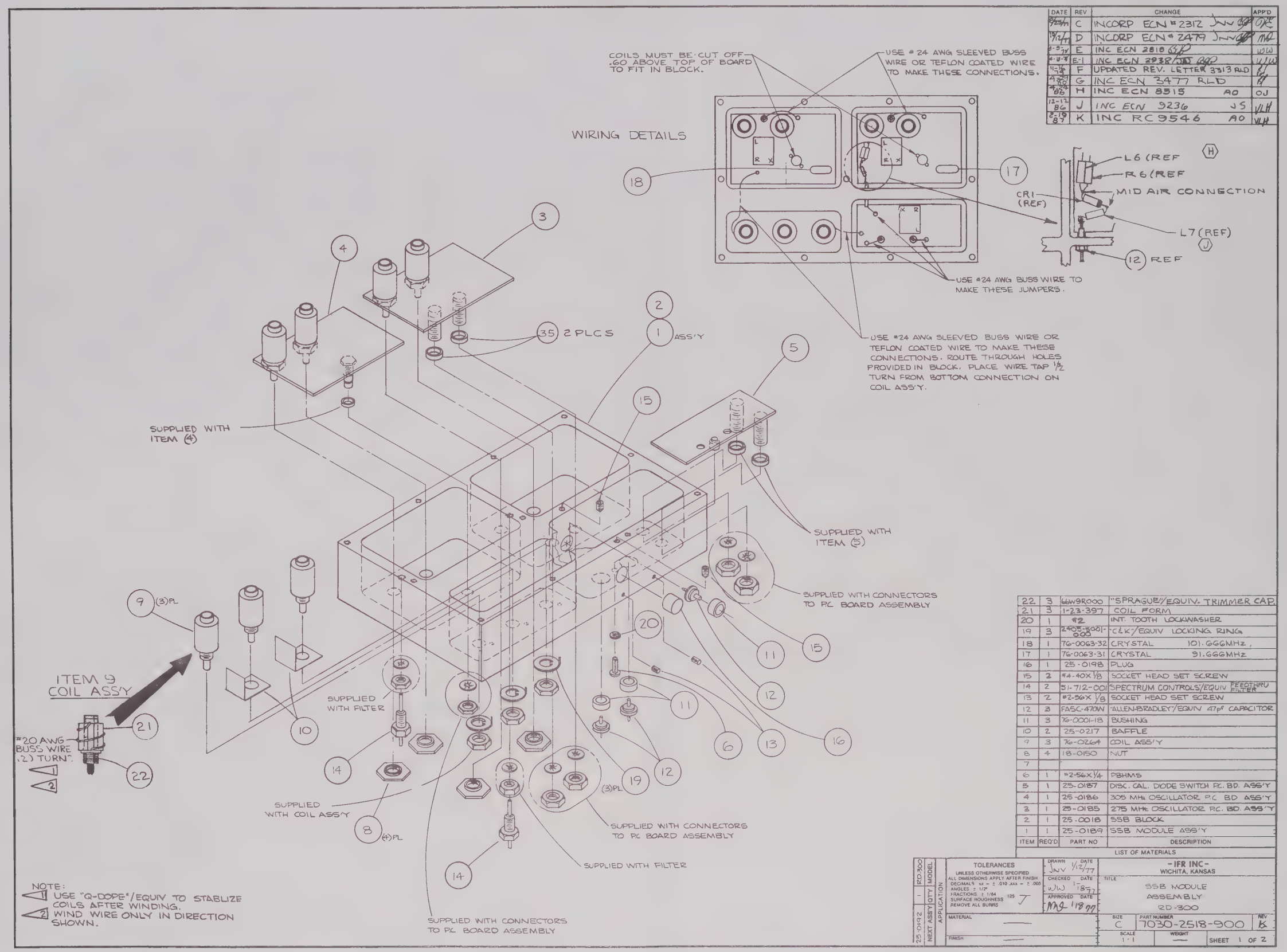
SIZE C · DWG NUMBER 2-25-0177 · REV C · SCALE 1X · WEIGHT — · SHEET 1 OF 1

Fig. 10-14



DATE | REV | CHANGE | APP'D
C | INCORP ECN # 2312
D | INCORP ECN # 2479
E | INC ECN 2818
E-1 | INC ECN 2938
WIRING DETAILS
COILS MUST BE CUT OFF .60 ABOVE TOP OF BOARD TO FIT IN BLOCK.
USE # 24 AWG SLEEVED BUSS WIRE OR TEFLON COATED WIRE TO MAKE THESE CONNECTIONS.
USE #24 AWG BUSS WIRE TO MAKE THESE JUMPERS.
USE #24 AWG SLEEVED BUSS WIRE OR TEFLON COATED WIRE TO MAKE THESE CONNECTIONS. ROUTE THROUGH HOLES PROVIDED IN BLOCK. PLACE WIRE TAP 1/2 TURN FROM BOTTOM CONNECTION ON COIL ASS'Y
SUPPLIED WITH ITEM (3)
SUPPLIED WITH ITEM (4)
SUPPLIED WITH ITEM (5)
SUPPLIED WITH CONNECTORS TO PC BOARD ASSEMBLY
SUPPLIED WITH FILTER
SUPPLIED WITH COIL ASS'Y
SUPPLIED WITH CONNECTORS TO PC BOARD ASSEMBLY
SUPPLIED WITH FILTER
SUPPLIED WITH CONNECTORS TO PC BOARD ASSEMBLY
1 ASS'Y
(3)PL
(4)PL
(3)PL
20 | 1 | #2 | INT TOOTH LOCKWASHER
19 | 3 | 1/4" | C&K/EQUIV LOCKING RING
18 | 1 | 76-0063-32 | CRYSTAL 101.666MHz
17 | 1 | 76-0063-31 | CRYSTAL 91.666MHz
16 | 1 | 25-0198 | PLUG
15 | 2 | #4-40X 1/8 | SOCKET HEAD SET SCREW
14 | 2 | 51-712-001 | SPECTRUM CONTROLS/EQUIV FEEDTHRU FILTER
13 | 2 | #2-56X 1/8 | SOCKET HEAD SET SCREW
12 | 3 | FASC-470W | ALLEN-BRADLEY/EQUIV 47pf CAPACITOR
11 | 3 | 76-0001-18 | BUSHING
0 | 2 | 25-0217 | BAFFLE
9 | 3 | 76-0264 | COIL ASS'Y
8 | 4 | 18-0150 | NUT
7
6 | 1 | #2-56X 1/4 | PBHMS
5 | 1 | 25-0187 | DISC CAL DIODE SWITCH PC BD ASS'Y
4 | 1 | 25-0186 | 305 MHz OSCILLATOR PC BD ASS'Y
3 | 1 | 25-0185 | 275 MHz OSCILLATOR PC BD ASS'Y
2 | 1 | 25-0018 | SSB BLOCK
1 | 1 | 25-0189 | SSB MODULE ASS'Y
ITEM | REQ'D | PART NO. | DESCRIPTION
LIST OF MATERIALS
TOLERANCES
UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS .XX = ± .010 .XXX = ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS
DRAWN JNV DATE 1/12/77
CHECKED WW DATE 1-18-77
APPROVED MAL DATE 1/18/77
MATERIAL
FINISH
- IFR INC -
WICHITA, KANSAS
TITLE SSB MODULE ASSEMBLY RD-300
SIZE C
PART NUMBER 3-25-0189
REV E-1
SCALE 1:1
WEIGHT
SHEET 1 OF 2
25-0192 | 1 | RD 300
NEXT ASSY | QTY | MODEL
APPLICATION

Fig. 10-15-1



DATE	REV	CHANGE	APP'D
8/25/71	C	INCORP ECN #2312 JNV	
10/12/71	D	INCORP ECN #2479 JNV	
8-9-72	E	INC ECN 2818	WW
4-11-73	E-1	INC ECN 2938	WW
11-16-74	F	UPDATED REV. LETTER 3313 RLD	
4-29-80	G	INC ECN 3477 RLD	
4-24-86	H	INC ECN 8515 AO	OJ
12-12-86	J	INC ECN 9236 JS	VLH
2-19-87	K	INC RC9546 AO	VLH

ITEM	REQ'D	PART NO	DESCRIPTION
22	3	66W9R000	"SPRAGUE"/EQUIV. TRIMMER CAP.
21	3	1-23-397	COIL FORM
20	1	#2	INT. TOOTH LOCKWASHER
19	3	2405-5001-000	"C&K"/EQUIV LOCKING RING
18	1	76-0063-32	CRYSTAL 101.666MHz,
17	1	76-0063-31	CRYSTAL 91.666MHz
16	1	25-0198	PLUG
15	2	#4-40X1/8	SOCKET HEAD SET SCREW
14	2	51-712-001	"SPECTRUM CONTROLS"/EQUIV FEEDTHRU FILTER
13	2	#2-56X1/8	SOCKET HEAD SET SCREW
12	3	FA5C-470W	"ALLEN-BRADLEY"/EQUIV 47pf CAPACITOR
11	3	76-0001-18	BUSHING
10	2	25-0217	BAFFLE
9	3	76-0264	COIL ASS'Y
8	4	18-0150	NUT
7			
6	1	#2-56X1/4	PBHMS
5	1	25-0187	DISC. CAL. DIODE SWITCH P.C. BD. ASS'Y
4	1	25-0186	305 MHz OSCILLATOR P.C. BD ASS'Y
3	1	25-0185	275 MHz OSCILLATOR P.C. BD. ASS'Y
2	1	25-0018	SSB BLOCK
1	1	25-0189	SSB MODULE ASS'Y

LIST OF MATERIALS

TOLERANCES UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH DECIMALS .xx = ± .010 .xxx = ± .005 ANGLES ± 1/2° FRACTIONS ± 1/64 SURFACE ROUGHNESS 125 REMOVE ALL BURRS

DRAWN JNV DATE 1/12/77 CHECKED WW DATE 1-18-77 APPROVED MJ DATE 1/18/77

MATERIAL — FINISH —

-IFR INC- WICHITA, KANSAS

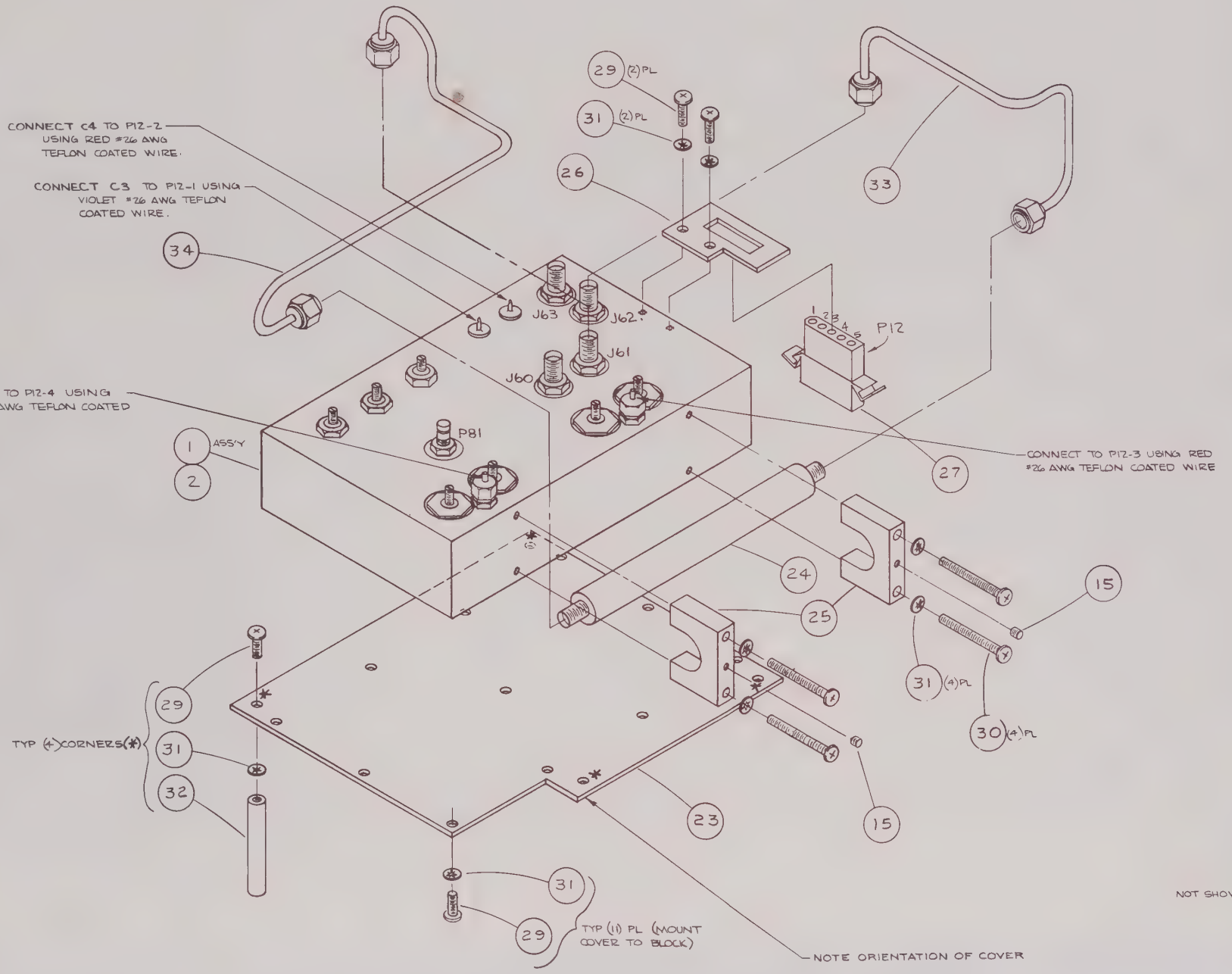
TITLE SSB MODULE ASSEMBLY RD-300

SIZE C PART NUMBER 7030-2518-900 REV K SCALE 1:1 WEIGHT — SHEET 1 OF 2

25-0192 NEXT ASSY QTY 1 MODEL RD-300 APPLICATION

Fig. 10-15-1-1

DATE	REV	CHANGE	APP'D
—	—	SEE SHT 1	—



NOT SHOWN

ITEM	REQ'D	PART NO.	DESCRIPTION
15	2	#4-40X 1/8	SOCKET HEAD SET SCREW
34	1	25-0216	SEMI-RIGID COAX ASS'Y
33	1	25-0215	SEMI-RIGID COAX ASS'Y
32	4	76-0001-35	STANDOFF
31	21	#4	INT. TOOTH LOCKWASHER
30	4	#4-40X 7/8	PBHMS
29	17	#4-40X 5/16	PBHMS
28	4	02-06-1132	MOLEX/EQUIV CRIMP JACK
27	1	03-06-1055	MOLEX/EQUIV CONN
26	1	25-0157	MOUNTING BRACKET
25	2	25-0046	MOUNTING BLOCK
24	1	58(839)/130	TEXCAN/EQUIV FILTER
23	1	25-0019	COVER
2	1	25-0018	55B BLOCK
1	1	25-0189	55B MODULE ASS'Y

LIST OF MATERIALS

NEXT ASSY	QTY	MODEL
75-0192	1	RD-300

APPLICATION

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS .XX = ± .010 .XXX = ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125 ✓
REMOVE ALL BURRS

MATERIAL —
FINISH —

DRAWN JNV 1/13/77
CHECKED WW 1/18/77
APPROVED DATE

- IFR INC -
WICHITA, KANSAS

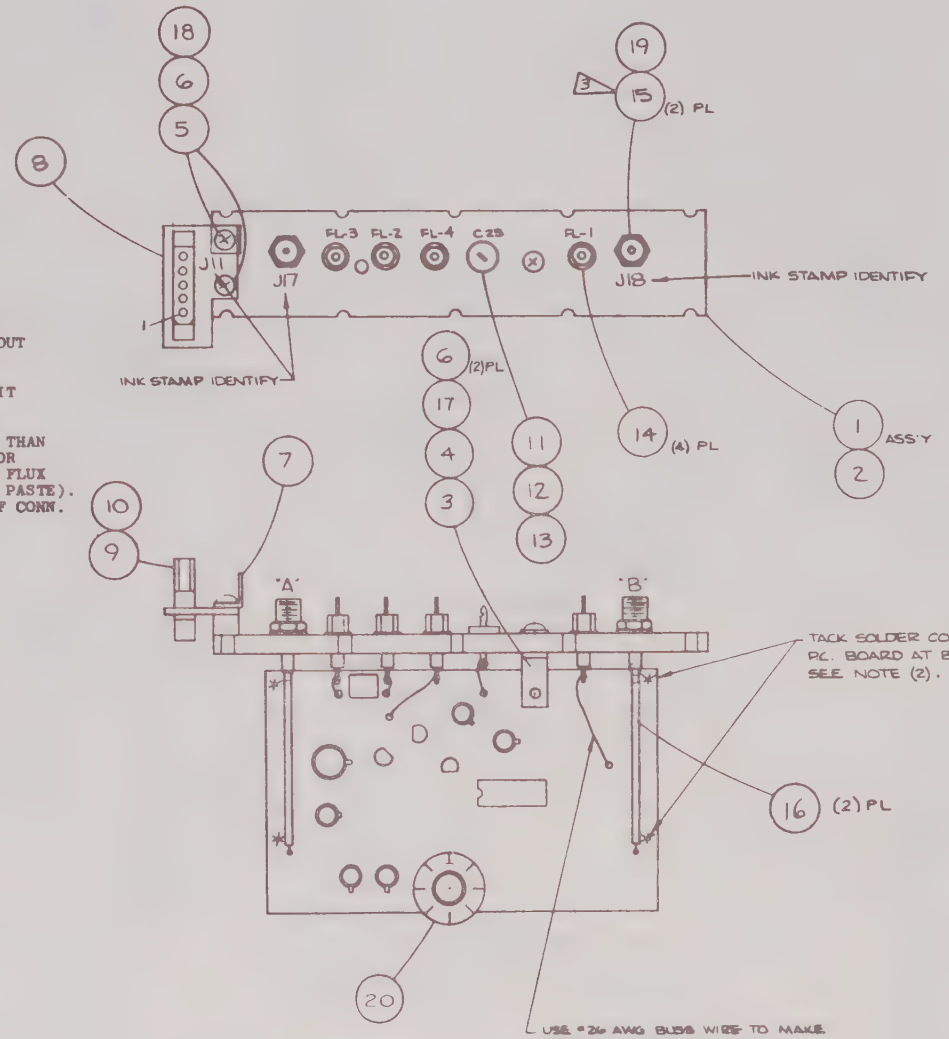
TITLE
55B MODULE ASSEMBLY
RD-300

SIZE C | PART NUMBER 7030-2518-900 | REV K5
SCALE 1X | WEIGHT — | SHEET 2 OF 2

Fig. 10-15-2-1

DATE	REV	CHANGE	APPD
8/17/76	A	INCORP. ECN # 1608, K&Ka	JNN
9/15/76	B	ADDED CONN. I.D. NOS.	JNN
12/15/76	C	INCORP. ECN # 1808	JNN
1/20/77	D	INCORP. ECN # 1902	WW
3-8-77	E	INCORP ECN # 2087 T.T.	WW
7/21/77	F	INCORP. ECN # 2284	WC
9/14/77	G	INCORP. ECN # 2458	WC
9/14/78	H	INC ECN 2856	WW

NOTES:
1. REFER TO ASS'Y PROCEDURE # 1-34-0100-2 FOR PROPER RIGID COAX ASS'Y INSTRUCTIONS. INSPECT PER CHECKOUT PROCEDURE LISTED AT RIGHT.
2. ATTACH RIGID COAX ASSYS TO P.C. BOARD AS FOLLOWS:
   a. LIGHTLY SAND OUTER JACKET OF COAX WITH #400 GRIT SANDPAPER TO REMOVE OXIDATION AND OTHER CONTAMINATES.
   b. SOLDER COAX JACKET TO P.C. BOARD USING NO MORE THAN ABOUT A 40 WATT SOLDERING IRON AND HEAT COAX FOR AS SHORT A PERIOD OF TIME AS POSSIBLE. LIQUID FLUX MAY BE USED IF NECESSARY (DO NOT USE SOLDERING PASTE).
3. PLACE ¼" EXT. TOOTH LOCKWASHER (ITEM 9) BETWEEN RF CONN. AND MOUNTING PLATE.



CHECKOUT PROCEDURE

Check for proper coax continuity after completion of the board as follows:

1. Use a "Midland" VOM model 23-107 or similar.
2. Select the "RX1" setting on the meter and check to see that the meter is properly zeroed on both ends of the scale.
3. Place the + (red) lead on the center conductor of the connector and the common (black) lead on the coax center conductor where it enters the PC board. This should obtain a reading of 0 ohms with both coax cables.
4. Place the + (red) lead on the center conductor of the connector and the common (black) lead on the large copper area on top of the board (ground). With coax "A" this should obtain a reading of 85-115 ohm. With coax "B" this should obtain no reading at all.

WIRING LIST				
FROM	TO	COLOR	SIZE	LNGTH
J1-1	FL-1	VIOLET	26	6
J1-2	C25	WHITE	26	5
J1-3	FL-2	RED	26	4
J1-4	FL-3	YELLOW	26	5½
J1-5	FL-4	VIO/WH	26	4½

ITEM	REQ'D	PART NO.	DESCRIPTION
20	1	TXCF 032-025	"THERNALLOY"/EQUIV. HEAT SINK
19	2	¼"	EXT TOOTH LOCKWASHER
18	2	2-76-0001-H	SPACER
17	1	#4-40 x 3/16	PBHNS
16	2	00-0167-245	COAX CABLE DETAIL
15	2	529001	"CABLEWAVE"/EQUIV. CONN.
14	4	8545553-1	"AMP"/EQUIV FEEDTHRU FILT.
13	1	#6-.56 x 1/16	SOCKET HEAD SET SCREW
12	1	3-281-18	BUSHING
11	1	PASC-470-CX	"ALLEN BRADLEY"/EQUIV. CAP.
10	5	02-06-1178	"MOLEX"/EQUIV. TERMINAL
9	1	03-06-1065	"MOLEX"/EQUIV. CONNECTOR
8	1	25-0057	CONN. MOUNTING BRACKET
7	1	TA-235	"T & B"/EQUIV. TERMINAL
6	4	#4	INT. TOOTH LOCKWASHER
5	2	#4-40 x 3/8	PBHMS
4	1	#4-40 x ¼	PBHMS
3	1	25-0064	MOUNTING BRACKET
2	1	25-0154	MOUNTING PLATE
1	1	25-0173	PC. BOARD ASS'Y

28-0173	1	RD-300
NEXT ASS'Y	QTY	MODEL

APPLICATION

LIST OF MATERIALS

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS ± .02 ± .010 .XXX ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125 ✓
REMOVE ALL BURRS

DRAWN JNN 6-7-76
CHECKED RKK 6/20/76
APPROVED MS 6-25-76

MATERIAL SEE ABOVE
TREATMENT —
FINISH —

INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS

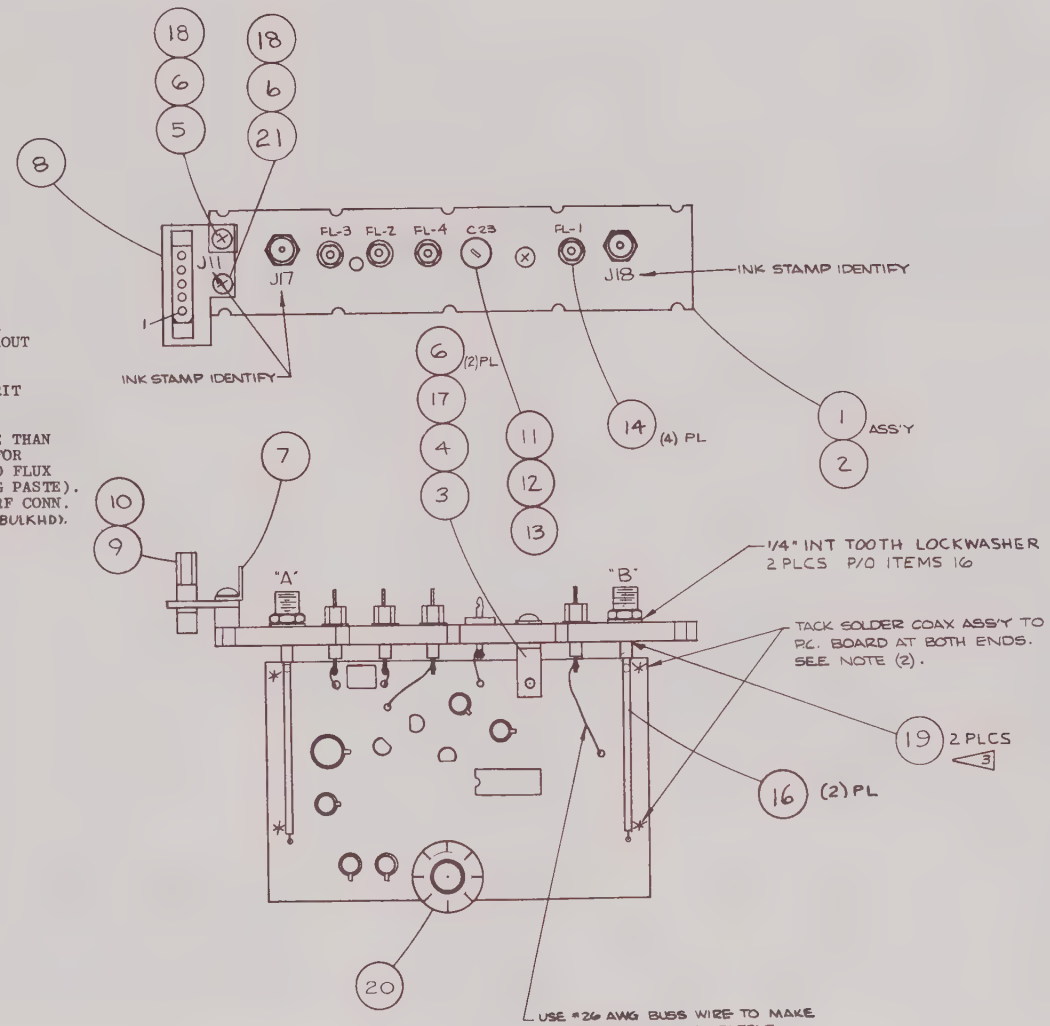
TITLE
ASSEMBLY DETAILS
IF GEN. POWER AMP PC BD.
RD-300

SIZE C | PART NUMBER 1-25-0173 | REV H
SCALE 1X | WEIGHT — | SHEET 1 of 2

Fig. 10-16

DATE	REV	CHANGE	APP'D
8-17-76	A	INCORP ECN #1608, 1616 JNV	
9/5/76	B	ADDED CONN I.D. NOS JNV	
12/21/76	C	INCORP. ECN # 1808 JNV	
1/28/77	D	INCORP. ECN# 1902 WW	
8-9-77	E	INCORP ECN # 2087 T.T.	
9/9/77	F	INCORP. ECN # 2284 WC	
10/11/77	G	INCORP. ECN # 2459 WC	
3/16/78	H	INC ECN 2856 JW	
10-5-78	J	INC. ECN # 3369 RLD	
11-28-78	K	UPDATED REV. LETTER 3313 RLD	
12-1-78	L	INC ECN # 3431 RLD	
4-24-80	M	INC ECN 3477 RLD	
11/4/82	N	INC ECN 3753 JC	
6-19-83	P	INC ECN #3834 RLD	
5-30-84	R	INC ENC 8538 "CHIPS"	

NOTES:
1. REFER TO ASS'Y PROCEDURE # 1-34-0100-2 FOR PROPER RIGID COAX ASS'Y INSTRUCTIONS. INSPECT PER CHECKOUT PROCEDURE LISTED AT RIGHT.
2. ATTACH RIGID COAX ASSYS TO P.C. BOARD AS FOLLOWS:
   a. LIGHTLY SAND OUTER JACKET OF COAX WITH #400 GRIT SANDPAPER TO REMOVE OXIDATION AND OTHER CONTAMINATES.
   b. SOLDER COAX JACKET TO P.C. BOARD USING NO MORE THAN ABOUT A 40 WATT SOLDERING IRON AND HEAT COAX FOR AS SHORT A PERIOD OF TIME AS POSSIBLE. LIQUID FLUX MAY BE USED IF NECESSARY (DO NOT USE SOLDERING PASTE).
3. PLACE ¼" EXT. TOOTH LOCKWASHER (ITEM 19) BETWEEN RF CONN. AND MOUNTING PLATE. (INSTALL ON BOTTOM SIDE OF BULKHD).



WIRING LIST				
FROM	TO	COLOR	SIZE	LNGTH
J1-1	FL-1	VIOLET	26	6
J1-2	C23	WHITE	26	5
J1-3	FL-2	RED	26	4
J1-4	FL-3	YELLOW	26	3½
J1-5	FL-4	V10/WH	26	4½

CHECKOUT PROCEDURE

Check for proper coax continuity after completion of the board as follows:

1. Use a "Midland" VOM model 23-107 or similar.
2. Select the "RX1" setting on the meter and check to see that the meter is properly zeroed on both ends of the scale.
3. Place the + (red) lead on the center conductor of the connector and the common (black) lead on the coax center conductor where it enters the PC board. This should obtain a reading of 0 ohms with both coax cables.
4. Place the + (red) lead on the center conductor of the connector and the common (black) lead on the large copper area on top of the board (ground). With coax "A" this should obtain a reading of 85-115 ohm. With coax "B" this should obtain no reading at all.

ITEM	REQ'D	PART NO.	DESCRIPTION
21	1	#4-40x½	PBHMS
20	1	TXCF 032-025	"THERMALLOY"/EQUIV. HEAT SINK
3 19	2	¼"	EXT TOOTH LOCKWASHER
18	2	2-76-0001-8	SPACER
17	1	#4-40x3/16	PBHMS
16	2	100-167-6	COAX CABLE DETAIL
15			
14	4	8545554-1	"AMP"/EQUIV. FEEDTHRU FILT.
13	1	#2-56x⅛	SOCKET HEAD SET SCREW
12	1	3-28-0081-18	BUSHING
11	1	FA8C-A70SW	"ALLEN BRADLEY"/EQUIV. CAP.
10	5	02-09-1132	"MOLEX"/EQUIV. TERMINAL
9	1	03-09-1058	"MOLEX"/EQUIV. CONNECTOR
8	1	25-0157	CONN. MOUNTING BRACKET
7	1	TA-255	"T&B"/EQUIV. TERMINAL
6	4	#4	INT. TOOTH LOCKWASHER
5	1	#4-40x3/16	PBHMS
4	1	#4-40x⅛	PBHMS
3	1	25-0164	MOUNTING BRACKET
2	1	25-0154	MOUNTING PLATE
1	1	25-0173	P.C. BOARD ASS'Y

25-0173	1	RD-300
NEXT ASS'Y	QTY	MODEL

LIST OF MATERIALS

APPLICATION

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS .xx ± .010 .xxx ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125 ✓
REMOVE ALL BURRS

DRAWN JNV 6-1-76
CHECKED RKK 6/28/76
APPROVED

INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS.

TITLE
ASSEMBLY DETAILS
IF GEN. POWER AMP PC BD.
RD-300

MATERIAL SEE ABOVE
TREATMENT —
FINISH —

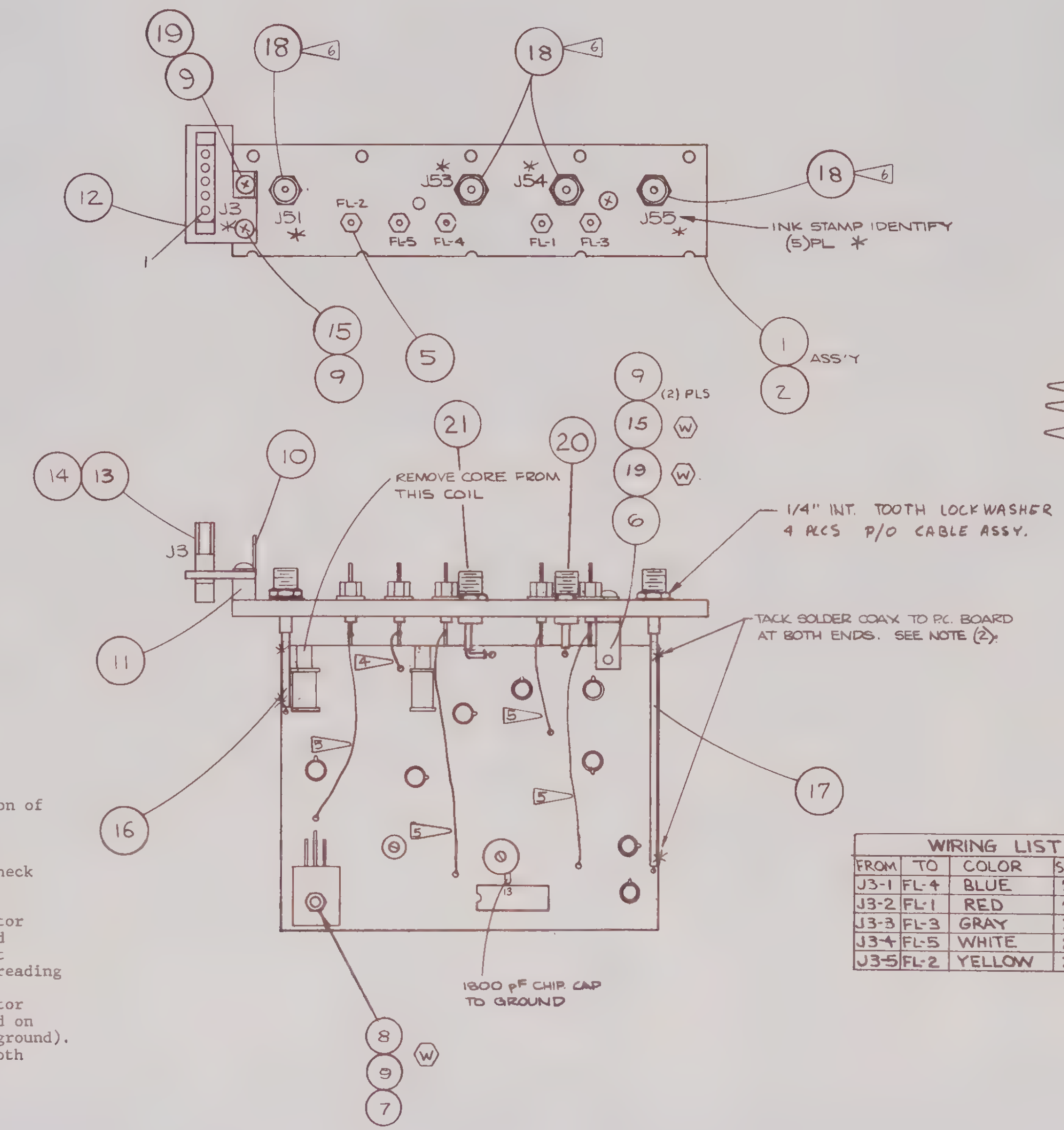
SIZE C | PART NUMBER 7010-2517-300 | REV. R
SCALE 1X | WEIGHT — | SHEET 1 OF 2

Fig. 10-16-1

DATE	REV	CHANGE	APP'D
3-5-84	V-1	UPDATED ART TO 'C'	
7-28-85	W	INC ECR 6578 AO	
7-2-87	Y	INC RC 10032 JS	VLH

DATE	REV	CHANGE	APP'D
8-2-76	A	INCORP ECN # 1613 & 1607 JNV WW	
9/15/76	B	ADDED CONN. ID. NO.S JNV WW	
11/4/76	C	INCORP ECN #1806 JNV	
1/24/77	D	ADDED SHT. 2 of 2 UU	
4/15/77	E	INCORP ECN # 2024 JNV WW	
8-27-77	F	INCORP ECN #2073	
6-14-78	H	INC ECN #3365 RLD	
7-13-79	J	INC ECN #3382 RLD	
10-5-79	K	INC ECN #3369, 3412 RLD	
11-16-79	L	UPDATED REV. LETTER 3313 RLD	
12-5-79	M	INC ECN #3431 RLD	
5-30-80	N	INC ECN 3477 RLD	
6-24-80	P	INC ECN #3461 RLD	
11-82	R	INC ECN #3606 OFG	
11-29-83	T	INC ECN 3834 TE	
4-7-83	V	INC ECN 4053 TE	

LEFT.



4 USE #26 AWG BUSS WIRE.
5 USE #26 AWG TEFLON COATED WIRE TO MAKE THESE CONNECTIONS.
6 INSTALL ON BOTTOM SIDE OF BOARD BETWEEN RF CONN & MOUNTING PLATE

CHECKOUT PROCEDURES

Check for proper coax continuity after completion of the board as follows:

1. Us a "Midland" VOM model 23-107 or similar.
2. Select the "RX1" setting on the meter and check to see that the meter is properly zeroed on both ends of the scale.
3. Place the + (red) lead on the center conductor of the connector and the common (black) lead on the center conductor of the coax where it enters the PC board. This should obtain a reading of 0 ohms with both coax cables.
4. Place the + (red) lead on the center conductor of the connector and the common (black) lead on the large copper area on top of the board (ground). This should obtain no reading at all with both coax cables.

WIRING LIST 5

FROM	TO	COLOR	SIZE	LEN.
J3-1	FL-4	BLUE	26	4.5
J3-2	FL-1	RED	26	5
J3-3	FL-3	GRAY	26	6
J3-4	FL-5	WHITE	26	4.5
J3-5	FL-2	YELLOW	26	4

ITEM	REQ'D	PART NO.	DESCRIPTION
21	1	00-167-2	CABLE ASS'Y
20	1	00-167-1	CABLE ASS'Y
19	1	#4-40×½	PBHMS
18	4	1/4"	EXT. TOOTH LOCKWASHER
17	1	1-00-167-9	CABLE ASS'Y
16	1	1-00-167-4	CABLE ASS'Y
15	1	#4-40×3/16	PBHMS
14	5	02-06-1132	"MOLEX"/EQUIV. TERMINAL
13	1	03-06-[illegible]	"MOLEX"/EQUIV. CONN.
12	1	25-0157	CONN. MOUNTING BRACKET
11	2	2-3-0001-1	SPACER
10	1	TA-255	"T" & B"/EQUIV TERMINAL
9	4	#4	INT. TOOTH LOCKWASHER
8	1	#4-40×5/16	PBHMS
7	1	2850-0000-020	HEX NUT
6	1	25-0164	MOUNTING BRACKET
5	5	51-712-001	SPEC. CONT."/EQUIV. FILTER
4			
3			
2	1	25-0156	MOUNTING PLATE
1	1	25-0175	P.C. BOARD ASS'Y

LIST OF MATERIALS

NEXT ASS'Y	QTY	MODEL
25-0175	1	RD-300

APPLICATION

TOLERANCES
UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: .xx = ± .010 .xxx = ± .005
ANGLES: ± 1/2°
FRACTIONS: ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS

DRAWN JNV DATE 5-28-76
CHECKED WW DATE 6/15/76
APPROVED DATE 7/10/76

MATERIAL SEE ABOVE
TREATMENT —
FINISH —

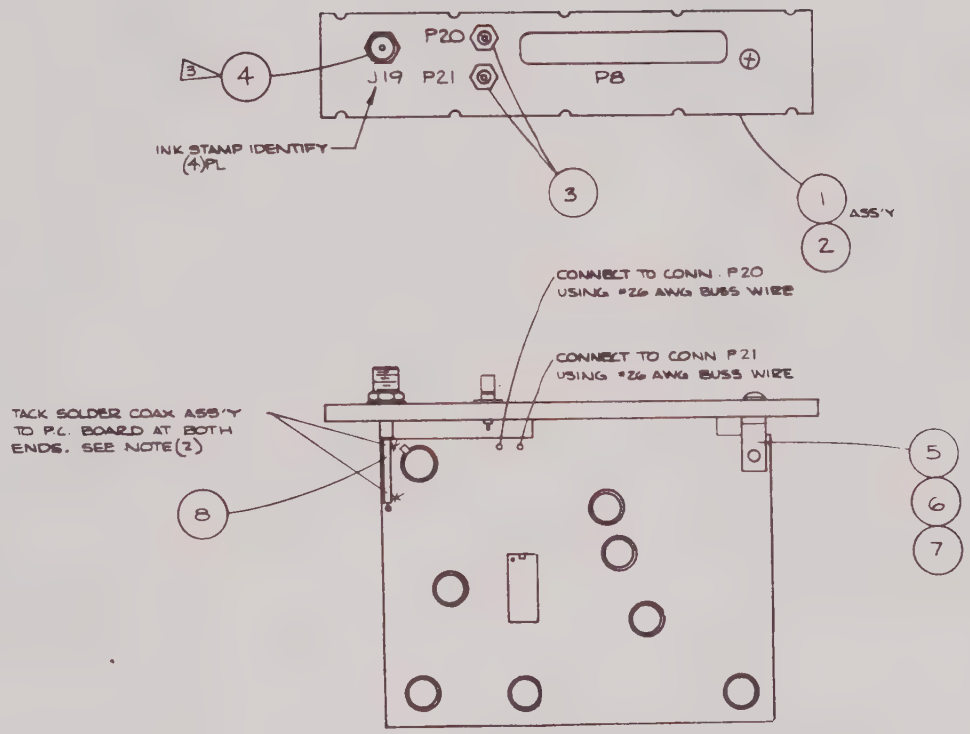
INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS.

TITLE ASSEMBLY DETAILS IF OSCILLATOR P.C. BOARD RD-300 3-25-175

SIZE C PART NUMBER 7010-2517-500 REV Y
SCALE 1X WEIGHT — SHEET 1 OF 2

Fig. 10-16-2

DATE	REV	CHANGE	APP'D
8/17/76	A	INCORP ECN #1617 JNV	[illegible]
9/15/76	B	ADDED CONN. I.D. NO.S JNV	[illegible]
9/15/76	C	INCORP ECN #1809 JNV	[illegible]
1/24/77	D	ADDED SHT 2 of 2 WU	[illegible]
2-21-77	E	INC ECN # 1940	[illegible]
7-7-77	F	INC ECN # 2040	[illegible]
8-4-77	G	INC ECN # 2152	[illegible]
8/29/77	H	INCORP ECN # 2259 LC	[illegible]
10/10/77	J	INCORP ECN # 2455 LC	[illegible]
1/4/78	K	INCORP. ECN # 2693 AA.	WW



CHECKOUT PROCEDURE

Check for proper coax continuity after completion of board as follows:

1. Use a "Midland" VOM model 23-107 or similar.
2. Select the "RX1" setting on the meter and check to see that the meter is properly zeroed on both ends of the scale.
3. Place the common (black) lead on the center conductor of the connector and the + (red) lead on the coax center conductor where it enters the PC board. This should obtain a reading of 0 ohms.
4. Place the common (black) lead on the center conductor of the connector and the + (red) lead on the large copper area on top of the board (ground). This should obtain a reading of approximately 800 ohms - 1000 ohm.

NOTES:

1. REFER TO ASS'Y PROCEDURE # 1-34-0100-2 FOR PROPER RIGID COAX ASS'Y INSTRUCTIONS. INSPECT PER CHECKOUT PROCEDURE LISTED AT RIGHT.
2. ATTACH RIGID COAX ASSYS TO P.C. BOARD AS FOLLOWS:
   a. LIGHTLY SAND OUTER JACKET OF COAX WITH #400 GRIT SANDPAPER TO REMOVE OXIDATION AND OTHER CONTAMINATES.
   b. SOLDER COAX JACKET TO P.C. BOARD USING NO MORE THAN ABOUT A 40 WATT SOLDERING IRON AND HEAT COAX FOR AS SHORT A PERIOD OF TIME AS POSSIBLE. LIQUID FLUX MAY BE USED IF NECESSARY (DO NOT USE SOLDERING PASTE).
3. PLACE ¼" EXT. TOOTH LOCKWASHER (ITEM 19) BETWEEN RF CONN. AND MOUNTING PLATE.

ITEM	REQ'D	PART NO	DESCRIPTION
9	1	1/4"	EXT TOOTH LOCKWASHER
8	1	00-0167-0145	COAX CABLE DETAIL
7	2	#4	INT TOOTH LOCKWASHER
6	2	#4-40X1/4	PBHMS
5	1	25-0164	MOUNTING BRACKET
4	1	529001	"CABLEWAVE"/EQUIV CONN.
3	2	19-0219-000	" AEP "/EQUIV CONN.
2	1	25-0165	MOUNTING PLATE
1	1	25-0174	PC BD. ASS'Y

LIST OF MATERIALS

NEXT ASS'Y	QTY	MODEL
25-0174	1	RD-300

APPLICATION

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS .XX = ± .010 .XXX = ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS

DRAWN JNV DATE 5-27-76
CHECKED KKK DATE 6/15/76
APPROVED [illegible] DATE 10/76

INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS.

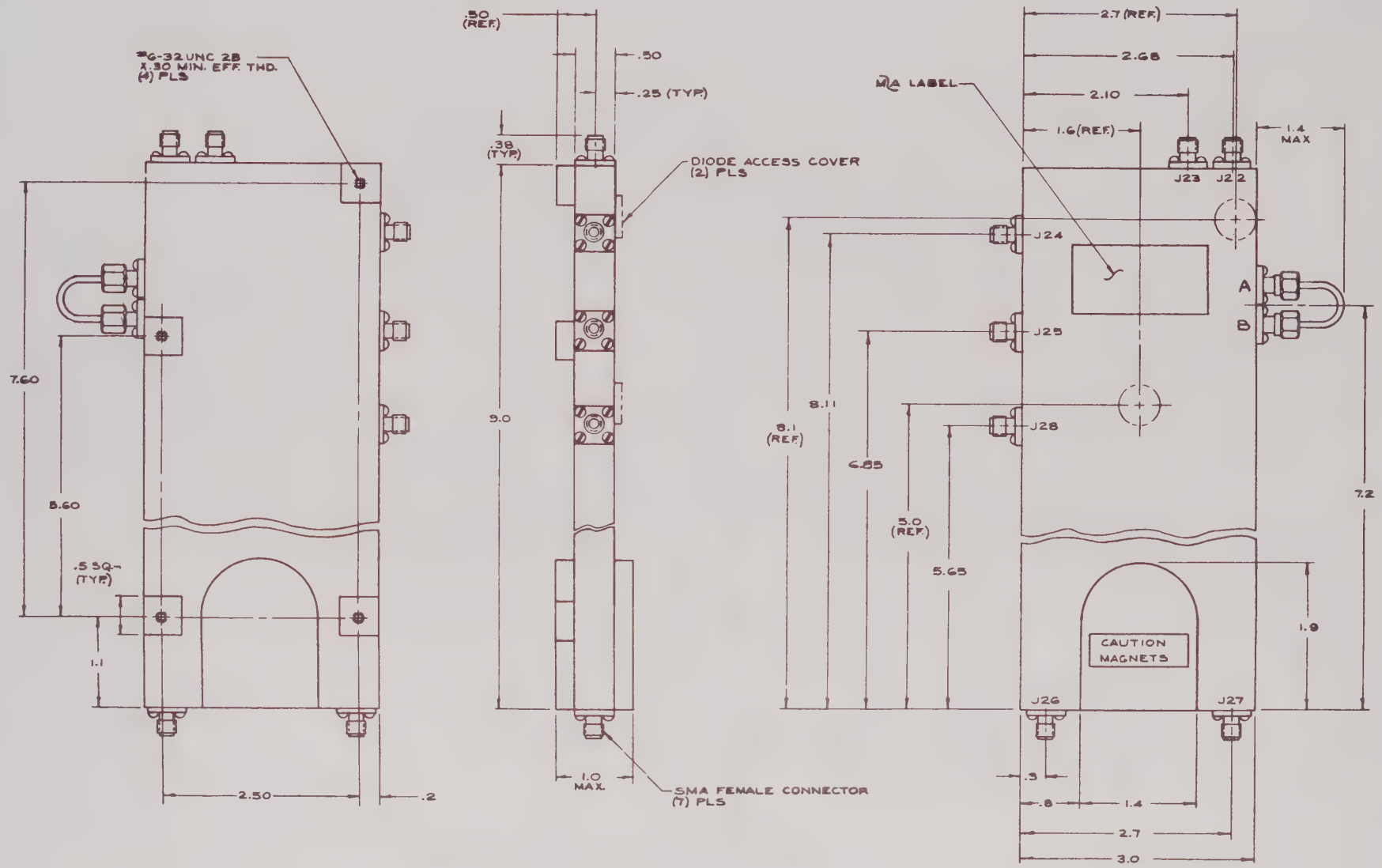
TITLE
ASSEMBLY DETAILS
AUXILIARY CIRCUIT BOARD
RD-300

MATERIAL SEE ABOVE
TREATMENT —
FINISH —

SIZE C | PART NUMBER 3-25-0174 | REV K
SCALE 1X | WEIGHT — | SHEET 1 OF 2

Fig. 10-17

DATE	REV	CHANGE	APP'D
		SEE SHEET 1	

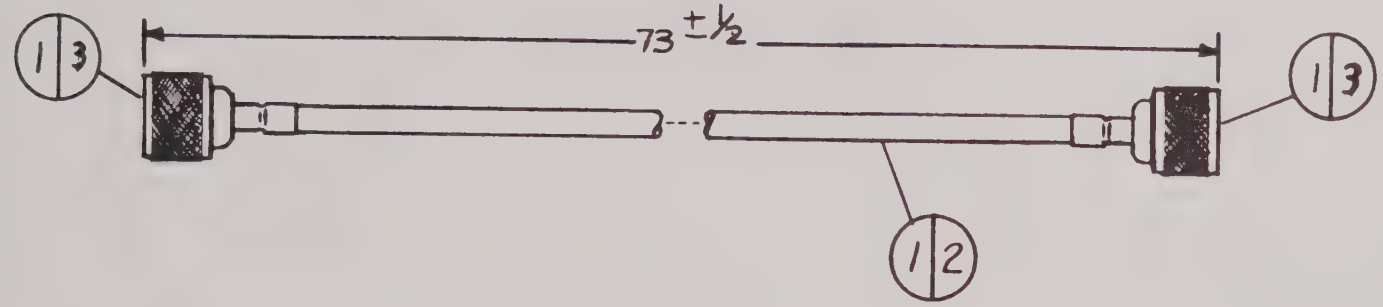


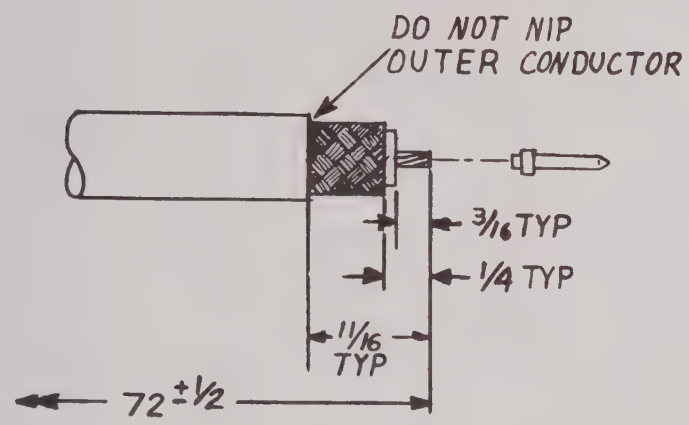
ITEM	REQ'D	PART NO.	DESCRIPTION
			LIST OF MATERIALS
1	1	3-25-0116	X-BAND FRONT END

MODEL	RD-300
QTY	1
NEXT ASS'Y	1-25-0192
APPLICATION	
TOLERANCES	UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH DECIMALS: .xx = ± .02 .xxx = ± .005 ANGLES: ± 1/2° FRACTIONS: ± 1/64 SURFACE ROUGHNESS REMOVE ALL BURRS 125
DRAWN	DD 9-10-76
CHECKED	9-10-76
APPROVED	9-10-76
MATERIAL	—
FINISH	—
	- IFR INC - WICHITA, KANSAS
TITLE	X-BAND FRONT END (PROPOSED)
SIZE	C
PART NUMBER	3-25-0116
REV	E
SCALE	1:1
WEIGHT	—
SHEET	2 OF 2

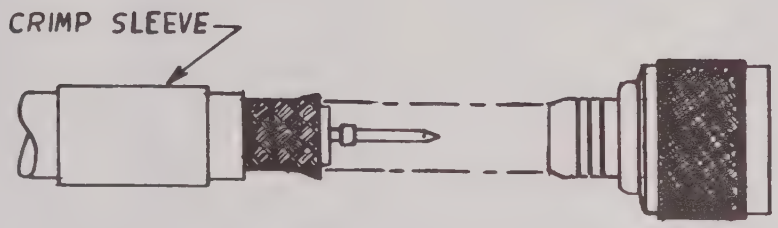
Fig. 10-18

DATE	REV	CHANGE	APP'D





TRIM CABLE TO DIMENSIONS SHOWN. PLACE CENTER CONTACT ON CENTER CONDUCTOR OF CABLE. CRIMP USING "AMP" 220015-1 CRIMP TOOL OR SOLDER.



SLIP CRIMP SLEEVE OVER END OF CABLE. FLARE OUTER CONDUCTOR SLIGHTLY AND INSERT CONNECTOR BODY ON CABLE WITH FLANGE BETWEEN DIELECTRIC AND OUTER CONDUCTOR. POSITION CRIMP SLEEVE AGAINST CONNECTOR AND CRIMP WITH "AMP" 220015-1 CRIMP TOOL.

NEXT ASS'Y	QT'Y	MODEL	ITEM	REQ'D	PART NO.	DESCRIPTION
25-0006	1	RD-300				

APPLICATION — LIST OF MATERIALS

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: ± .005
ANGLES: ± 1/2°
FRACTIONS: ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS

DRAWN DLR DATE 6-9-77
CHECKED MD DATE 6-9-77
APPROVED MD DATE 6-9-77

INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS

TITLE RD-300 ACCESSORY CABLE ASS'Y

MATERIAL SEE P/L 1-25-0254
TREATMENT —
FINISH —

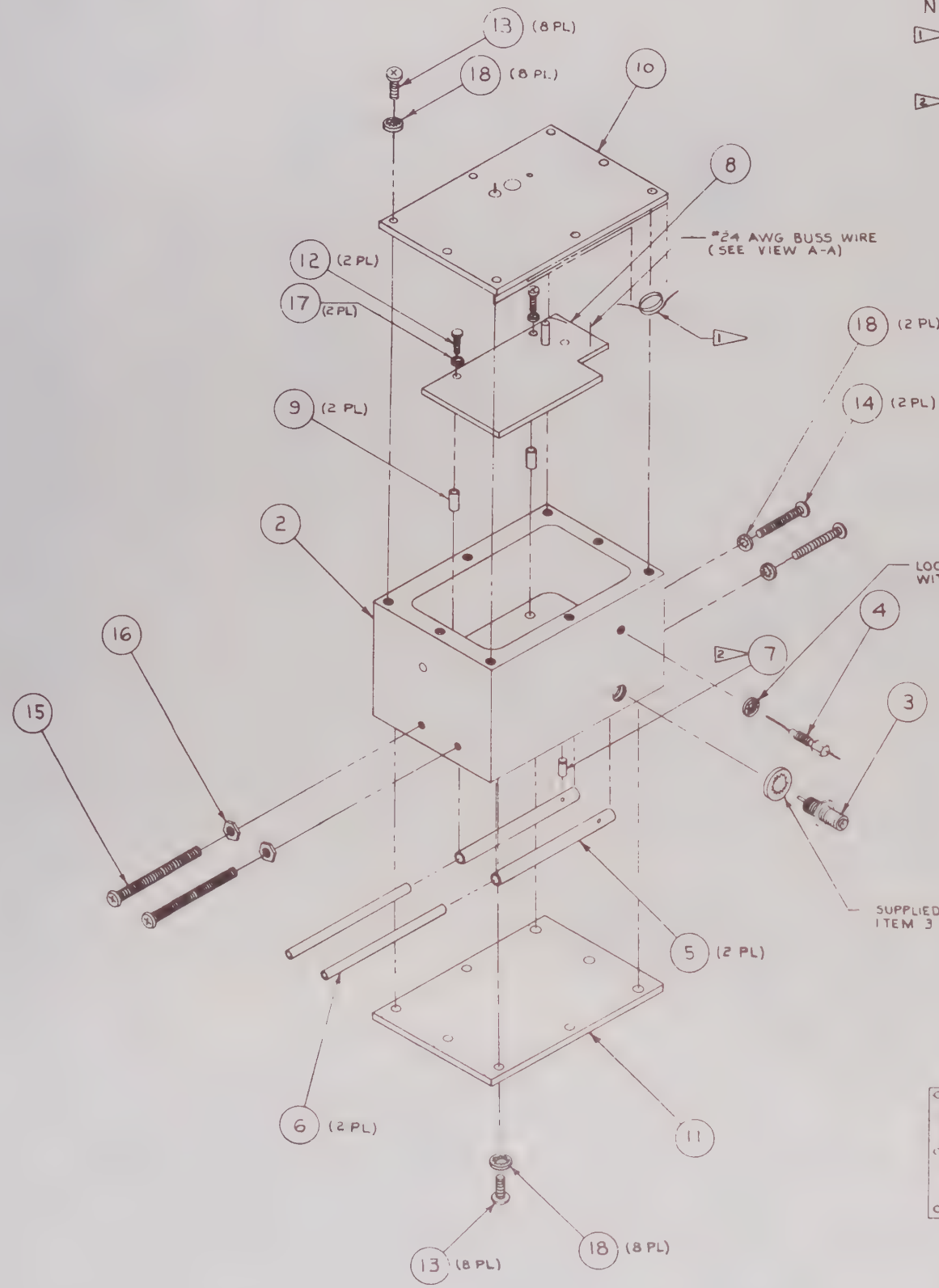
SIZE B | PART NUMBER 2-25-0254 | REV —
SCALE — | WEIGHT — | SHEET 1 OF

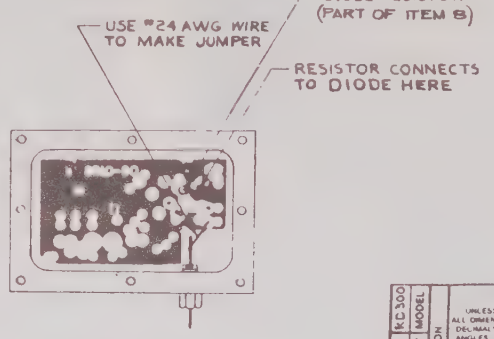
Fig. 10-19

NOTES:

1. WIND COIL BY WRAPPING #24 AWG SLEEVED BUSS WIRE 2 1/2 TIMES AROUND A 5/16" DIA ROD. CONNECT ENDS OF WIRE TO TERMINALS ON COVER.
2. SOLDER DIODE TO TUNING POLE WITH BANDED END AWAY FROM TUNING POLE. CONNECT BANDED END TO 6.8Ω RESISTOR (SEE VIEW A-A)

DATE	REV	CHANGE	APPD





VIEW A-A

ITEM	REQ'D	PART NO	DESCRIPTION
18	18	#4	INT TOOTH LOCKWASHER
17	2	#2	INT TOOTH LOCKWASHER
16	2	#4-40	LARGE PATTERN HEX NUT
15	2	#4-40X1 1/8	PBHMS
14	2	#4-40X5/8	PBHMS
13	16	#4-40X1/4	PBHMS
12	2	#2-56X3/8	PBHMS
11	1	25-0193	COVER
10	1	18-0175	COVER
9	2	76-0001-56	STANDOFF
8	1	05-0016	PC BOARD ASS'Y
7	1	PR-161	"PARAMETRICS"/EQUIV DIODE
6	2	1/8 ID X 1.7LG	TYPE "E" TEFLON TUBING
5	2	08-0081	TUNING POLE
4	1	859555-1	"AMP"/EQUIV FEEDTHRU FILTER
3	1	2058-0000	"AMERICON"/EQUIV CONNECTOR
2	1	18-0167	OSCILLATOR MULTIPLIER BLK
1	1	25-0196	900 MHz LOCAL OSCILLATOR ASSY

LIST OF MATERIALS

MODEL	RC300
QTY	1
ASS'Y	25-0192
NEXT ASS'Y	
APPLICATION	

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS ± .XX = ± .010 .XXX = ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125 ✓
REMOVE ALL BURRS

MATERIAL —
FINISH —

DRAWN RKK 2/10/77
CHECKED JNV 3/11/77
APPROVED

- IFR INC -
WICHITA, KANSAS

TITLE: 900 MHz LOCAL OSCILLATOR ASS'Y

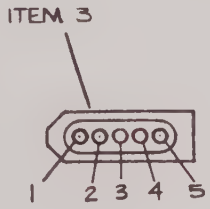
SIZE C | PART NUMBER 3-25-0196 | REV
SCALE 1:1 | WEIGHT — | SHEET 1 OF 1

Fig. 10-20

DATE	REV	CHANGE	APP'D

NOTES:

1. USE 1 1/2" WHITE TEFLON COATED WIRE, #22 AWG WITH ITEM 4 ATTACHED BOTH ENDS TO MAKE CONNECTIONS BETWEEN CONNECTOR PINS.
2. PLACE JUMPERS PER NOTE 1 BETWEEN PINS 1 & 3, AND PINS 2 & 4 TO CREATE -1 PART.
3. PLACE JUMPER PER NOTE 1 BETWEEN PINS 2 & 3 TO CREATE -2 PART.
4. MARK PLUG WITH PERMANENT INK AS 110V FOR -1, 220 V FOR -2 PER VIEW AT LEFT.



ITEM	REQ'D	PART NO.	DESCRIPTION
4	6	02-06-2132	"MOLEX"/EQUIV CRIMP TERM.
3	2	03-06-2055	"MOLEX"/EQUIV PLUG
2	1	25-0253-2	PLUG ASS'Y
1	1	25-0253-1	PLUG ASS'Y

LIST OF MATERIALS

APPLICATION	RD-300
MODEL	1
QTY	25-0006
NEXT ASS'Y	

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: .xx = ± .010 .xxx = ± .005
ANGLES: ± 1/2°
FRACTIONS: ± 1/64
SURFACE ROUGHNESS 125 J
REMOVE ALL BURRS

DRAWN JNV DATE 1 24 77
CHECKED MJ DATE 1 25 77
APPROVED MJ DATE 1 25 77

-IFR INC-
WICHITA, KANSAS

TITLE
PLUG, TRANSFORMER
PRIMARY PROGRAMMING
RD-300

MATERIAL —
FINISH —

SIZE A | PART NUMBER 1-25-0253 | REV
SCALE 1X | WEIGHT — | SHEET 1 OF 1

Fig. 10-21

MP MASTER
MA3C514